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Improved Carving Machine.

This machine, the engraving and description of which we copy from *Engineering*, was specially designed by its inventor, Mr. Jordan, for assisting in the production of the vast amount of carved decorations required for the walls and ceilings of the Houses of Parliament, London, and it was so employed during the entire progress of the work. The late Sir Charles Barry was so well satisfied with it, that he frequently declared it would have been impossible to have accomplished the work without it. The department of Woods and Forests employed five of the machines at the Government Works, Thames Bank, for several years; and the machines have now passed into the hands of Messrs. George Trollope and Son, and are still used in the same building. Other leading firms have them in use, and the works first established, by the patentee, at Belvedere road, are still in full operation, principally on church fittings.

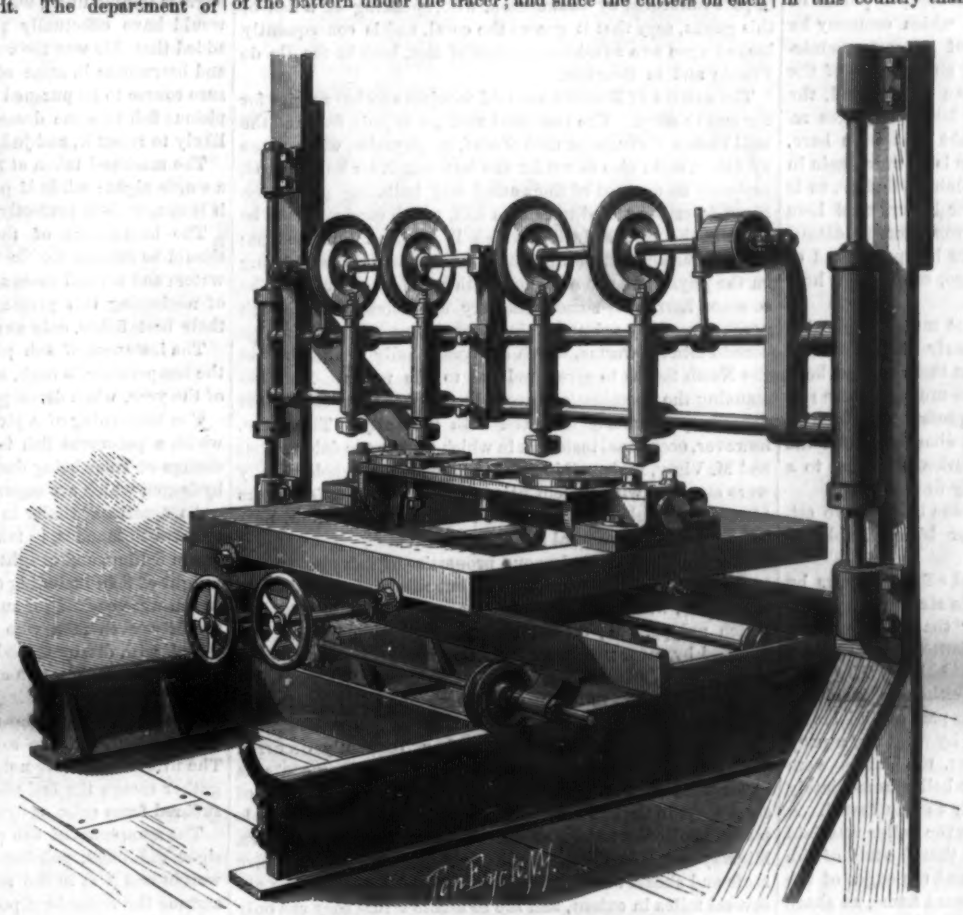
The new machines are like the originals in principle and general construction, but are greatly improved in some of the details, especially in those which tend to facilitate the production of works on the round, or such as require a large amount of under and through cutting.

The large machine consists of two principal parts: the first, a horizontal part, is a bedplate having two parallel rails, on which a frame, fitted with double-flanged wheels, travels; this frame, in like manner, presents two parallel rails at right angles to the former, on which the top casting, or floating table, rolls by its wheels, for flat work, such as the paneling of the House of Lords. This iron table is covered with wood, as the readiest means of fixing the work to it; but for round work another apparatus is fixed on it, called a turntable; this is fitted with three chucks, which revolve in it and are identically divided by deep square notches in their edges; and the table is fitted with detaining latches, which fall into the notches and keep each chuck securely fixed, in any position the workman gives it, in the plane of the table. The table itself is also fitted to revolve in bearings, which are fixed on the permanent horizontal table of the machine, and the motion can also be arrested, and the table fixed at any angle given it by the workman.

The pattern, of which it is desired to make copies, is fixed on the center chuck, and the pieces of wood, or other material for the work, are fixed on the other two chucks.

The revolution of the cutters at the high velocity required is obtained by beveled friction gearing, in which the elasticity of vulcanized rubber is well introduced.

The manipulation of the machine will now be readily understood. The workman takes his stand in front of the machine, with one hand on each of the hand wheels, and one foot on the treadle; with the right hand he can traverse the table from side to side; with the left, he can roll it to or from him, and by aid of these two motions he can bring any point of the pattern under the tracer; and since the cutters on each side are at the same distance from it as the centers of the respective chucks, they will always have the same relative positions to the blocks being carved. Hence, when the tracer has in succession been brought in contact with every point of the pattern, two exact copies of it will have been produced. But, in order to bring every point of a round pattern under the tracer, it is requisite to present all its sides upwards at various angles, and this is done by the two revolving motions of the turntable, previously described.



JORDAN'S CARVING MACHINE.

Mr. Jordan has also brought out a smaller machine, to be worked by hand wheel, which is capable of carving any statuette, or other subject within its range; this he calls the amateur carving machine, and, we doubt not, it will shortly become popular with the lovers of mechanical work, since it is capable of producing very closely elaborate work in hard or soft wood, ivory, alabaster, and marble, or in any other meterial which can be worked with a steel drill; and, indeed, we see no reason why it should not be applied to the harder materials, also, by substituting the abrasive tools of the lapidary for the steel cutters.

The second or vertical part of the machine is supported by side columns from floor to ceiling. It consists of a stiff parallel frame, which extends across the horizontal portion of the machine, and is fitted with mandrils which carry the carving tools, and a central head which carries the tracer. The whole of this frame is capable of motion in a vertical plane only, and its weight is very nearly balanced by a heavy treadle, with which it is connected by overhead levers and suspension rods, in such a way as to bring the vertical motion of the cutter and tracer under the management of the workman's foot.

SETTING LONG PLAIN CYLINDER BOILERS.

From a paper, entitled "the Durability of Steam Boilers," read by Mr. Jeremiah Head, of Middlesborough, England, before the Iron and Steel Institute, at their meeting in South Wales, Sept. 6, 1870, we extract some facts of interest relative to the number of plain cylinder boilers used in England, and defects in setting them, which lead to their rupture. There is probably as large a proportion of plain cylinder boilers used in this country than in England; at least there are enough of them in use to render a discussion of their merits and demerits, of interest and profit to steam users in America.

Throughout the manufacturing districts of the Eastern States they are quite popular, and also in the iron districts of Pennsylvania. On the Mississippi river and its tributaries they are very generally employed. We have not in our possession statistics by which we can arrive at an accurate statement of their number, in proportion to boilers of other types, but we judge it must be fully up to the English standard.

Mr. Head's paper is long, and we shall condense such extracts as we may make from it as much as possible, only aiming to place before our readers, the leading facts stated and points made in his argument.

The total number of boilers insured in the various associations and steam boiler insurance companies in England is 17,825, of which 4,052(22·7 per cent) are of the plain cylinder type. The accompanying engraving illustrates a boiler quite commonly used in the coal and iron districts of the north of England. A represents the main flue, in which an average temperature of about 750° Fah. is maintained. B is the damper, C, blow-off pipe, D, bearers, from which the boiler is suspended, as shown in section, Fig. 2. E represents the feed valves, F, the feed pipe, G, the steam valve, H, the steam main, I, the safety valve, J, the grate, and K, the suspension rods, of which last there are nine. The common method of setting these boilers in brick-work is shown in the section, Fig 2.

The suspension rods are secured to T-irons riveted to the boiler, and have double eyes at their lower, and adjustable nuts resting upon the bearers at their upper, ends. In this way the heating surface is not interfered with by the supports, and the latter are preserved from contact with high heats. The fittings consist of the following, viz.: Glass water gage, float gage, two safety valves, steam valve, feed valve, and mud cock. The steam, feed, and mud valves are directly connected with the same transverse mains, as the similar fittings of other boilers in the same range. The mud cock is fixed to the end of the boiler farthest from the grate, and a downward inclination in that direction assists in securing the complete removal of water and mud, when required.

Such a boiler is as simple as could possibly be constructed. No great bending or flanging tests are applied to the plates, and therefore an ordinary quality and ordinary workmanship are alone necessary.

Fig. 1

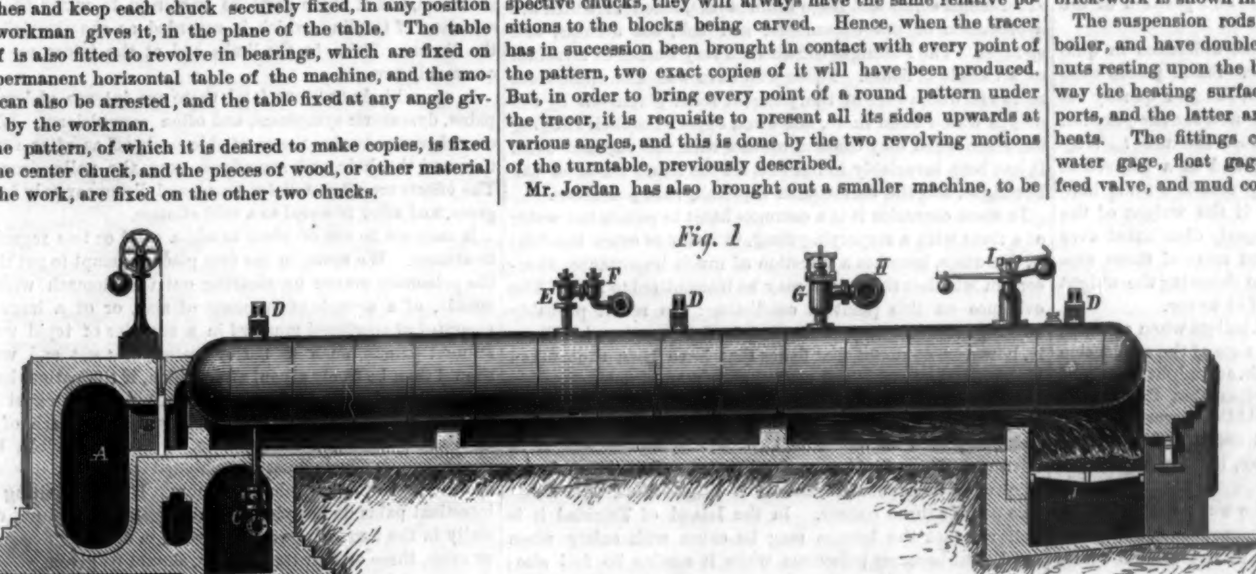


Fig. 2

ENGLISH LONG PLAIN CYLINDER BOILER.

The diameter being moderate, a high pressure may safely be maintained without the use of thick plates, and without the expense of double riveting and drilling holes. The brick work is simple and easily maintained, and the boiler is readily examined for cleaning or repairs, both inside and out.

Should the water be impure, this latter advantage becomes very prominent. Again, the risk of overheating for lack of water is much less than with internally fired boilers. The great quantity of water contained, undisplaced by internal flues or tubes, is a security against rapid change of level; and even should such change take place, it must amount to something very considerable before any portion of the heating surface in the locality of excessive heat would be laid bare.

Indeed it would not be easy to cause such a boiler to explode merely for lack of water. The cost is much less than of more complicated boilers. A boiler like the one shown, 45 feet long and 4 feet in diameter weighs 5½ tuns, and costs in England, delivered, about $475 gold. It would have a grate surface of 24 square feet, and a heating surface of 283 square feet. It would consume 420 pounds of coal per hour, and its average evaporative capacity would be about 7·7 pounds of water per pound of coal consumed.

Mr. Head estimates the average evaporative power of internally fired boilers at 8·4 pounds of water per pound of coal, a difference of about 9 per cent, which economy he thinks is fully balanced by extra cost of interest, maintenance, and depreciation. As coal is, in many parts of the United States, much dearer in price than in England, the gain through economy of fuel would be larger in places remote from sources of fuel; but we doubt that even here, taking all things into consideration, there is as much gain in the use of internally fired boilers over plain cylinders, as is generally supposed. The plain cylinder boilers used here are, however, not generally as long, in proportion to diameter, as those of which Mr. Head speaks in his paper, and of course do not therefore, on the average, extract the heat from the gases so fully.

The question, then arises, why is it that more complicated boilers find so much favor? Costing nearly three times as much, and, so far as the contrast between them has yet been carried, apparently more dangerous, there must be some reason not yet considered, for the decided preference which in England has reduced their number to about one fifth the total number of boilers used, and in America is leading to a more and more extended use of internally fired boilers.

This reason is, in Mr. Head's opinion, due to defective setting, which renders long plain cylinder boilers liable to break their backs.

The engraving is that of a boiler laid off for repairs by reason of fractures, for the second time in six years.

"It will be observed," says Mr. Head, "that the fractures are all in a transverse direction at the bottom side, and extend upwards towards the top of the boiler. They all pass through the line of rivet holes of either an inside or outside lap. They are not found at that part of the boiler exposed to the fiercest heat. Although, by means of a peep hole in the main flue beyond the damper, the flames were observed to extend the full length of the boiler immediately after firing, they usually appeared only as illustrated. A minute examination of the bottom, after the boiler was laid off and turned up to the light, showed that the fins of the rivets, the marks of the caulking tools, and the edges of the plates, were, except in the region of constant flame, as sharp and fresh as ever. The feed being introduced at nearly boiling temperature, and in a direction parallel with the bottom, could hardly be supposed to have had any influence, especially when the relative magnitude and position of the cracks in regard to it is considered.

"There did not appear to be any great difference in quality between the top and bottom plates. Small pieces were cut from each locality and broken cold, but the quality revealed was fully equal to the average used for the purpose.

"How then shall we account for these fractures? Why should they be always at the bottom and in a transverse direction? Is not the action of heavy tensile strains indicated—strains which could not exist if the weight of the boiler, and the water inside, were properly distributed over the several bearers? Is it possible that some of these supports are occasionally not acting, and so throwing the weight they ought to bear upon the others? Let us see.

"Passing over the tops of a range of boilers when at work, the writer has often observed that the nuts of the suspension rods at one end of the boilers were slack, and might be turned by the hand. This led to the reflection that that end of each boiler must be resting on the middle bearer alone. A tendency to raise the other end would result, and so almost the whole weight—say, including water, 16 tuns, would fall to the share of one bearer.

"When a boiler ceased work, and the water within cooled, the nuts of the end suspension rods became fast, and could no longer be moved, while the nuts of the middle bearer exhibited signs of lifting.

"The boiler thus appeared to have been at one time supported from a single point, with 22½ feet of length, and 8 tuns weight either way: and, at another time, to have been stretched between two supports 38 feet apart, and having, say, 14 tuns intervening. Such an operation, especially if often repeated, would obviously suffice to destroy structures of the nature we have under consideration."

Passing over the detailed consideration of the *modus operandi* of expansion and contraction, which a boiler of this kind undergoes, and its consequent alteration in shape by the lifting of the ends when the under side is hotter than the upper side, which he maintains is always the case when the boiler is making steam, we come to the remedy proposed. This is, to place upon the suspension rods volute springs beneath their nuts, so that upon alteration of shape of the boiler, the raised parts may still be supported by their appropriate rods, instead of transferring their entire strain to the middle portion of the boiler.

It is obvious that any method of setting a plain cylinder boiler upon immovable supports is open to the same objection as the method described by Mr. Head as so generally in use in the north of England, and that the general principle of compensating springs proposed by him is applicable to all boilers of this class.

POISONOUS FISHES.

Condensed from All the Year Round.

The noxious properties of some fishes are supposed to be dependent upon the nature of their food. Munier, in a letter to the well-known naturalist, Sonnerat, written nearly a century ago, states that in Bourbon, and in Mauritius, none of the parrot fishes, which in those islands are called by the popular names of vieille, or old wife, perroquet, etc., are eaten between December and the beginning of April, being regarded as unwholesome during that period, because they then eat large quantities of coral polyps. This statement is in part confirmed by Commerson, who, speaking of a fish of this genus, says that it gnaws the coral, and is consequently looked upon as a suspicious article of diet, both in the Ile de France and in Bourbon.

The natives of Bombay are said to reject another species for the same reason. The beautiful medusa or jelly fish, and the well known Portuguese men-of-war, or physalia, when eaten by fishes, seem also to render the latter unfit for human food, probably on account of their acrid and irritating properties. Risso describes a Mediterranean fish, which cannot safely be eaten at the periods during which it feeds on this medusa; and the sardine of the Antilles is so poisonous, after feeding on the physalia, as to occasion death in a few minutes. The common herring is sometimes very unwholesome, although perhaps scarcely poisonous, in consequence of its living on certain minute worms, which are occasionally so abundant in the North Sea as to give a red tint to the water. Notwithstanding the abominations greedily devoured by eels, these fishes may generally be eaten with impunity. There are, however, occasional instances in which they prove deleterious; and M. Virey, in describing a case in which a whole family were attacked with violent pains and diarrhœa, a few hours after eating eels taken from a stagnant castle ditch, near Orleans, refers to several similar accidents.

In many cases the poisonous properties of fish may be due to the food of which they partake, but this cannot be the sole cause: for, while poisonous fishes are found in localities in which polyps, etc., do not abound, in certain islands surrounded by these zoöphytes the fishes are safely edible. The barracouta is, as a general rule, eaten with perfect immunity in Trinidad, while in the neighboring island of Grenada, and in most of the other parts of the West Indies, death, or lingering sickness for many years, has frequently occurred after eating this fish in its fresh state. The barracouta is fit for food in Trinidad, in consequence of the absence of coral reefs in that island, while for the opposite reason it is poisonous in Grenada and elsewhere in the West Indies. Midway between Cuba, Hayti, and Jamaica, lie extensive reefs and shoals of the Formigas (or Ants' Nests). They are several miles in extent, and are so shallow that they can only be navigated by moderate-sized vessels in a smooth sea. They closely resemble the fringing shore reefs that have been so often described; presenting to the eye of the naturalist arborescent corals and huge brain stones, amongst which are a profusion of sea cucumbers, star fish, sea urchins, and sponges. The Formigas constitute a very warren or vivarium of all kinds of fishes. Those who have waded on these coral reefs are well aware of the pungent scent given out by the polyps which build there, and often experience their stinging influence when they come in contact with the exposed skin. It has been invariably found that all the fishes taken on the Formigas, and the barracoutas especially, are poisonous.

In some countries it is a common habit to poison the water of a river with a stupefying drug, in order to catch the fish; it, therefore, becomes a question of much importance, to ascertain whether the poison may be transmitted to man. The evidence on this point is conflicting: the result probably varying according to the nature of the drug employed. There is, however, no doubt that fishes that have been thus taken become dangerous, if not cooked and eaten at once.

The age and size of the fish are supposed in some species to influence their unwholesomeness, certain kinds of fishes being regarded as edible in their youth, and poisonous in advanced life. In Havannah there is a fish which is not allowed to be exposed for sale if it weighs more than about two pounds three ounces. In the Island of Trinidad it is believed that the becuna may be eaten with safety when small, but becomes poisonous when it attains its full size; and Dr. Court, who practised medicine there for some time, states that the same rule applies to all the fishes said to be poisonous. The natives of Hayti hold a similar opinion regarding a species known by English sailors as the rock fish.

The season of the year is supposed by some writers to have an effect in rendering certain fishes dangerous as food. In the Loyalty Islands, M. Jouan, the captain of a French frigate, has found that many species are dangerous, and even deadly, at some periods of the year, while at others they may be eaten with impunity. It is possible that "the season of the year" may be only another expression for "the food of fishes at certain times." While the process of spawning is going on, it has been observed that certain fishes become dangerous articles of food, the eggs and milt being especially virulent. The conger eel is said to occasion dysentery if it be eaten at this period. The spawn of the barbel, and to a less degree that of the pike and burbot, will occasionally, if eaten, induce great irritation; and if it be necessary to eat these fishes during the spawning period, the milt and roe should be carefully removed.

In countries in which poisonous fish abound, certain tests are in general use with the view of deciding whether any particular specimen may be safely brought to table. M. Poey states that "in barracouta, that are in a condition to produce mischief, the roots of their teeth will be found of a blackened color; and that, wanting this mark, the fish may be eaten without fear; or," he adds, "if a silver spoon or coin, placed in the vessel in which the cooking is going on, be not blackened, the fish is equally safe." Dr. Hill, to a certain degree, confirms the efficacy of the tooth test.

Several co-partakers of the becuna, were seized very shortly after the conclusion of the repast. After full vomiting, they all recovered under the administration of enormous doses of laudanum. On mentioning this circumstance to a West Indian, he said that the accident must have proceeded from culpable negligence on the part of the host, who, before introducing such a fish to his guests, should, knowing how dangerous it was, have first given the head to one of his negroes to dine upon, which, having taken effect upon him, would have effectually prevented all that followed. He added that this was the common way of dealing with quaco and barracouta in some of the Leeward Islands. The only sure course to be pursued is that of giving the offal of suspicious fish to some domestic animal, such as a duck, not likely to reject it, and judging by what ensues.

The mackerel taken at St. Helena is poisonous if kept for a single night; while if prepared on the same day on which it is caught, it is perfectly fit for food.

The inhabitants of the Antilles assert that the bonito should be dressed for the table as soon as it is taken from the water; and several cases are on record illustrating the danger of neglecting this precaution. The Chinese will eat one of their best fishes, only as soon as it is captured.

The instances of fish poisoning occur almost solely where the temperature is high, and especially in the hottest period of the year, when decomposition is most rapid.

The blackening of a piece of silver placed in the vessel in which a poisonous fish is cooked, supports this view: the change of color being due to the liberation of sulphuretted hydrogen which accompanies decay of tissue.

An American whaler in March, 1854, stopped at the island of Juan Fernandez, to take in water, and some of the men began fishing, and caught more than four hundred pounds weight of fish, including carangues, capitaines, and old wives, which were cooked for supper. In a few hours forty-two of the fifty-seven men who formed the ship's company, were seized with dizziness, abdominal pains, nausea, and repeated vomitings. Prostration and coma then came on, and in eleven hours from the beginning of the seizure, thirty-four of the sailors were dead. The remaining eight, after suffering extremely for from five to eight days, gradually recovered. The fifteen who were not put on the sick list, did not altogether escape the bad effects of the meal; several of them suffered from colic or dysentery for two or three days.

The symptoms of fish poisoning are dizziness, dimness of sight, giddiness, palpitation of the heart, and a feeling of weight and heat in the stomach and abdomen. Obliged to assume the recumbent position, the patient notices an itching of the skin; the face, and other parts, presenting red or white blotches, surrounded by a crimson ring. In the palms of the hands and soles of the feet the itching amounts to a burning sensation, and if these parts be immersed in water there is a feeling of tingling, which is regarded as characteristic of the disease. Pains in the limbs and at the joints are also commonly present.

In cases likely to prove fatal there are intense abdominal pains, dysenteric symptoms, and often convulsions. When convalescence begins the scarf skin peels off as after scarlatina, and the hair, and sometimes even the nails, drop off. The effects are often felt for years, and disappear only by degrees, and after removal to a cold climate.

It may not be out of place to add a word or two regarding treatment. We must, in the first place, attempt to get rid of the poisonous matter by clearing out the stomach with an emetic, of a scruple of sulphate of zinc, or of a large teaspoonful of powdered mustard in a tumbler of tepid water. Diluent drinks, such as barley water, or toast and water, should then be freely given, after which, if the patient be not too prostrated, a dose of castor oil will serve to expel any noxious matter that may have got beyond the reach of the emetic. The poison having thus, as far as possible, been evacuated, its effects must be combated with stimulants, such as coffee, wine, and alcoholic liquors. If the vomiting and intestinal pains do not yield to this treatment, opium, especially in the form of Dover's powder, in doses of five grains or more, three or four times a day, should be given.

The enormous consumption of whites of eggs, in albuminizing paper for photographic purposes, may be doomed to come to an end. *Dingler's Journal* announces a substitute for albumen for this purpose, under the name of lactarine. It is a white or slightly yellow powder, with the odor of casein. When subjected to ether, a small amount of saponaceous fat may be extracted from the mixture. The powder resists water, but is accessible to the influence of the alkalies, either caustic or carbonated. Treated with the proper proportion of either acetic or hydrochloric acid, a curd is precipitated, which is found to be soluble in excess of the acid. In use, it is dissolved in ammonia, and can be colored to any required shade.

EXPERIMENTS ON THE OXIDATION OF IRON.

Read before the Manchester Literary and Philosophical Society, by Prof. F. Crace Calvert, Ph.D., F.R.S., etc.

Some two years since, Sir Charles Fox inquired of me if I could give him the exact composition of iron rust, namely, the oxidation found on the surface of metallic iron. I replied that it was admitted by all chemists to be the hydrate of the sesquioxide of iron, containing a trace of ammonia; to this he answered, that he had read several books on the subject in which the statements referring to it differed, and from recent observations he had made, he doubted the correctness of the acknowledged composition of iron rust. He further stated that if he took a bar of rusted wrought iron, and put it in violent vibrations, by applying at one end the fall of a hammer, scales would be separated which did not appear to him to be the substance I had described.

This conversation induced me to commence a series of experiments which I shall now detail. I first carefully analyzed some specimens of iron rust, which were procured as free as possible from any source of contamination. Thus, one of these samples was supplied to me by Sir Charles Fox, as taken from the outside of Conway Bridge, the other secured by myself at Llangollen, North Wales. These specimens gave the following results when submitted to analysis:

	Conway Bridge.	Llangollen.
Sesquioxide of iron	93·094	92·900
Protoxide of iron	5·810	0·177
Carbonate of iron	0·900	0·617
Silica	0·196	0·121
Ammonia	Trace.	Trace.
Carbonate of lime		0·295

These results clearly show the correctness of Sir Charles Fox's foresight, that the composition of the rust of iron is far more complicated than is stated in our text books. Therefore the question may be asked, is the oxidation of iron due to the direct action of the oxygen of the atmosphere, or to the decomposition of its aqueous vapor? or does the very small quantity of carbonic acid which it contains determine or intensify the oxidation of metallic iron? To reply to it, I have made a long series of experiments, extending over two years, and which I hope will throw some light on this very important question.

Perfectly cleaned blades of steel and iron, having a gutta-percha mass at one end, were introduced in tubes which were placed over a mercury trough, and by a current of pure oxygen conducted to the top of the experimental tube, the atmosphere was displaced, and it was then easy to introduce in these tubes traces of moisture, carbonic acid, and ammonia.

After a period of four months, the blades of iron so exposed gave the following results:

Dry oxygen	No oxidation.
Damp oxygen	In three experiments only one blade slightly oxidized.
Dry carbonic acid	No oxidation.
Damp carbonic acid	Slight appearance of a white precipitate of the iron, found to be carbonate of iron. Two only out of six experiments did not give these results.
Dry carbonic acid and oxygen	No oxidation.
Damp oxygen and carbonic acid	Oxidation most rapid, a few hours being sufficient. The blade assumed a dark green color, which then turned to brown ocher.
Dry oxygen and ammonia	No oxidation.
Damp oxygen and ammonia	No oxidation.

The above results prove that under the conditions described, pure and dry oxygen does not determine the oxidation of iron, that moist oxygen has only feeble action; dry or moist pure carbonic acid has no action, but moist oxygen containing traces of carbonic acid acts most rapidly on iron, giving rise to protoxide of iron, then to carbonate of the same oxide, and last to a mixture of saline oxide and hydrate of the sesquioxide of iron.

These facts tend to show that carbonic acid is the agent which determines the oxidation of iron, and justifies me in assuming that it is the presence of carbonic acid in the atmosphere, and not its oxygen nor its aqueous vapor, which determines the oxidation of iron in common air. Although this statement may be objected to at first sight, on the ground of the small amount of carbonic acid gas existing in the atmosphere, still we must bear in mind that a piece of iron, when exposed to atmospheric influences, comes in contact with large quantities of carbonic acid during twenty-four hours.

These results appeared to me so interesting that I decided to institute several series of experiments.

When perfectly clean blades, of the best quality of commercial iron, are placed in ordinary Manchester water they rust with great facility; but if the water be previously well boiled and deprived of oxygen and carbonic acid, they will not rust for several weeks. Again, if a blade of the same metal is half immersed in a bottle containing equal volumes of pure distilled water and oxygen, that portion dipping in the water becomes rapidly covered with the hydrate of the peroxide of iron, while the upper part of the blade remains for weeks unoxidized; but if a blade be placed in a mixture of carbonic acid and oxygen, a very different chemical action ensues, as not only that portion of the blade dipping in the water is rapidly attacked, but the upper part of it immediately shows the result of chemical action and also the subsequent chemical re-actions are greatly modified by the presence of the carbonic acid. For in this case that portion of the blade is only covered with a film of carbon, together with a dark deposit, composed of carbonate of the protoxide and hydrate of the sesquioxide. The fluid, instead of remaining clear, becomes turbid.

These series of experiments substantiate the interesting fact observed—that carbonic acid promotes oxidation.

A long series of experiments was also made, to try and throw some light on the curious fact, first published by Berzelius, subsequently studied by other chemists, and well known to soap and alkali manufacturers, namely, that caustic alkalies prevent the oxidation of iron. My researches can be resumed as follows:

1 That the carbonates and bicarbonates of the alkalies possess the same property as their hydrates; and

2. That if an iron blade be half immersed in a solution of the above mentioned carbonates, they exert such a preservative influence on that portion of the bar which is exposed to an atmosphere of common air (oxygen and carbonic acid), that it does not oxidize even after a period of two years.

Similar results were obtained with sea water to which had been added carbonates of potash and soda.

HISTORICAL AND ANTIQUARIAN COLLECTIONS IN NEW YORK.

The museum and library of the New York Historical Society, in Second avenue, is interesting, not only to the man of learning and the *savan*, but also to every man, woman, and child of average intelligence.

Although several of the most valuable of the collections of curiosities and antiquities committed to the safe keeping of the Society (such as the Indian collection and the Peruvian antiquities), are at present hidden away from sight, owing to the want of sufficient space and the necessary accommodation, yet enough remain to occupy the attention and supply instructive and amusing food to the mind for weeks and months. The museum, as presented to the public at the present time, consists chiefly of a very rare and antique collection of Egyptian antiquities, together with a number of objects of national interest, culled from the vicinity of New York, and the continent of America generally.

EGYPTIAN REMAINS.

The Abbott collection of Egyptian antiquities, although not so imposing in effect as those of London and Paris, owing to to the absence of the colossal statues to be found in these cities, is richer than they by far in specimens illustrative of the manners, customs and every day life of that ancient and mysterious people. The collection was formed under the most favorable auspices. Dr. Abbott, a well known scholar, during a residence of twenty years in Cairo, had many opportunities of obtaining all that was most valuable, which came to the light, during the time of his residence there. It was his delight to occupy his spare hours in diving down into the ancient tombs, and when valuable relics were to be had, he spared neither time nor expense in securing them. Many of these relics were taken out of their original deposits under the surveillance of Dr. Abbott, and their genuineness has been vouched for by Sir Gardner Wilkinson, J. Pening, Lepsins, Poole, and other well known Eastern scholars. To the student, the antiquary and the divine there is a vast field presented for verification, illustration and comparison.

One of the most startling of the relics is the remains of three mummied bulls, of the sacred breed Apis, found in the tombs at Dashour. It is believed, with good reason, that they are the only specimens known of in the world at present. The Egyptians honored this animal as an image of the soul of Osiris, and believed that this soul migrated from one Apis to another in succession. The death of the animal was the signal for general mourning, and its obsequies were performed with much pomp.

Two earrings and a necklace found in a jar at Dendera bear the name of Menes, the first Pharoah of Egypt, who reigned 2750 B. C., and who has been considered to be the oldest King of whom we have any record in history. The ornaments are made of gold, and there are three pendants of lapis lazuli attached to the centre, where is also an oval amethyst head, capped at each end with gold.

There is a very fine sand stone head, which at one time must have formed part of a colossal statue of Thothmes III., the Pharoah of the Exodus and the tyrant of the Hebrews. A gold signet ring bears the name of Shoofoo, the Cheops who built the first pyramid. The hieroglyphics engraved upon it are distinct, and in some respects peculiar.

The iron hemlet of Shishak, along with his breast plate and armorial bearings, are in a very fair state of preservation. This King is understood to be the same that carried Rehoboam captive from Jerusalem 971 years before Christ.

It has been related by Herodotus that, at the entertainments of the rich Egyptians, just as the company were about to rise from the repast, a small coffin was carried round containing a perfect representation of a dead body, and the bearer exclaimed: "Cast your eyes on this figure; after death you yourself will resemble it; drink then and be happy." Accordingly, the Society has one of those mummies, in a coffin which was used for this singular purpose.

A battle-ax formed of bronze, and firmly bound to a handle by means of slender interlaced thongs, is worthy of attention on account of the beauty of the workmanship, as is also a bronze dagger beside it, with a horn handle attached to the blade with silver rivets.

Seventeen Chinese vases, a padlock and other articles found in Egyptian tombs in Thebes, Sakarah and Ghisch, prove the communication which existed at an early date between the Egyptian and the Flowery land. A beautiful little figure, in gold, of a bird, with a human head and the wings expanded, was taken from the breast of a mummy, and typifies the departure of the soul from the body.

A magnificent funeral papyrus, twenty two feet long, is covered with hieroglyphics and finely illuminated. Upon it is sketched out the whole belief of the Egyptians of the life after death, their ideas of a future state and of rewards and punishments. From it is learned the reason of the strict attention which they paid to preserving and mummifying the bodies of the dead, believing as they did, that the soul after purification in purgatory was allowed to return to earth and to reoccupy the body, if this last had been preserved in a perfect state. A caricature painted upon a fragment of limestone is a sample of what humor was in those ancient times. The caricature represents a lion seated as a king upon a throne, and a fox officiating as high priest, and making an offering of a plucked goose and a native fan. An oblong box, with a drawer for containing twenty-one porcelain pieces, has two separate series of squares upon the lid, evidently intended as a field for the working out of several games.

When we come next to inspect the smaller and less important implements of every-day life, nothing is more striking than the fact of their similarity in ancient times in many respects to those of the present day.

Here is a maiden's foot well preserved, of great symmetry, with the toe nails distinctly marked as if she had died but yesterday. The foot is ensconced in a tight fitting white kid shoe, such as might be purchased today in a fashionable boot-maker's in Fifth avenue; and there are many such in the museum, of various colors, such as purple, red, buff, etc., with gilding upon them. Household jars with long pointed ends to stick in the mud, very elegant in form, were used for containing wine; one of those now in the museum, contained a number of eggs at the time of its discovery, which are still in an excellent state of preservation.

A unique example of primitive ingenuity is to be found in six conical stamps used by the Egyptian Government for sealing the locks of the public granaries. The locks were covered with the mud of the Nile, and were stamped while wet with the Government stamp, after which they could not be opened without breaking the impression of the Government seal. Besides those specimens of home life three thousand years ago in the "cradle of knowledge" which have all been noticed, there is a perfect host of others too numerous to mention.

The bread which that ancient people ate, their grain, the bricks of Egypt, (made with and without straw), needlework, children's toys, dolls, woolen and linen cloth, toilet stands for ladies when darkening the margins of the eyelids, chignons almost identical with those of 1871, false hair, chessmen, rings, beads and porcelain ornaments of every description; also, a large number of mummied animals, such as cats snakes, monkeys, &c.

It is worthy of note that Louis Napoleon, when resident in America, came to the museum, especially for the purpose of seeing the mummied animals, and exhibited great interest while inspecting them. At that time the sacred bulls stood upon their feet, but having decayed much from exposure to the air, they are now preserved in a glass case. Another memento of a different kind must have made a deep impression upon him, being none other than the chair in which his great uncle Napoleon I., presided as First Consul over the meetings of the French Assembly. The chair is plain and yet handsome, the seat being covered with crimson tapestry and the wood work partially gilded.

Besides these foregoing antiquities there are those of other nations, chief among which are the Aztec statuary, the Lennox collection of Assyrian sculptures, and many objects of historical interest, both ancient and modern. The historical gallery of portraits is a chief feature in the museum, and will become more valuable every year. The works of fine art, especially the Bryan collection, would require a day to be devoted to themselves, and there is employment to a connoisseur for a month. The Crawford marbles have gained a standard celebrity.—*N. Y. Times.*

Trial of a Balloon Propeller.

Inventors who are giving their attention to the great balloon problem, which the siege of Paris raised anew for solution, will not be disheartened by the failure of M. Richard in "Le Duquesne." This balloon had attached to it machinery by which M. Richard hoped to control its direction. The machinery consisted of two screws, easily worked, and rotating only at a rate of twenty-five rotations per minute. The diameter being four yards, the motion of the screws in feet per second was about sixteen, or five or six times more than the rapidity intended to be given to the balloon—three miles an hour. M. de Fonvielle, who reports the experiment, pleads that the conditions were unfavorable. Night was chosen instead of day, and the reigning current was a strong southwest wind, which was against the aerial voyagers escaping the Prussian lines. Considerable interest was manifested in the experiment, and many French *savans* collected at the Orleans station to see the balloon off. It was evident from the commencement that the directing machinery failed. M. Richard and his three sailor companions had no more control over their balloon than aeronauts whose balloons have no directing machinery. In other ways they were unlucky. As the balloon descended, one of the projecting screw axes caught the ground, the car was upset, and its four inmates dragged under it for several hundreds of yards in a perilous position. The three sailors were only injured slightly, but M. Richard was believed to be dead when he was picked up. Notwithstanding the failure of this attempt to navigate Le Duquesne, M. de Fonvielle promises to make another experiment, the scene of which is to be the Crystal Palace, London, provided he can obtain the consent of the authorities there.

SCIENCE has often been talked of as a revealer of knowledge, but it is much better described as the embodiment of knowledge classified.

THE AMERICAN MECHANIC.

"Come hither, ye who press your beds of down
And sleep not: see him sweating o'er his bread,
Before he eats it. 'Tis the primal curse,
But softened into mercy; made the pledge
Of cheerful days, and nights without a groan."

Our artist has produced for our readers this week a spirited sketch of an American mechanic resting from his work, at the hour of noon. The shop in which he sits is quiet; the noise of whirling machinery, of ponderous hammers and mighty engines, has ceased; and with the keen appetite that labor gives, he has seated himself to his simple meal. The tin pail, so contrived as to be a convenient receptacle for coffee, butter, cold meat, bread, and pastry, without mixing the whole mass into what a printer would figuratively call "pi," stands by his side.

If the curious reader will rise sufficiently early, and place himself on one of the thoroughfares leading to the manufacturing localities of this city, he may see thousands of these tin pails hurrying along to their destination. Could he follow each of them to its work, and follow it home at night, he might see many a sight that would make him wiser, better, more sympathizing with his fellow-men, and more patient under the trials and difficulties which beset his own pathway. On the other hand, could he, from following the tin pails, turn to follow the elegant carriages, which daily surround Stewart's dry goods palace, and step with their occupants into splendid up-town mansions, he would probably discover that true happiness is found in the humble mechanic's home as much as in the gilded saloon, and that the rich have their sorrows as well as the honest sons of toil.

Perhaps there is no position in which a man can be placed, which has more elements of content to a healthy mind and body than that of the first-class American mechanic. Earning enough for present comfort, and, with prudence, being able to gradually accumulate a store for a "rainy day;" mind and body both occupied in skilled labor, and both performing their functions with the ease and pleasure that health bestows; sufficiently intelligent and well informed, to follow and discuss the leading topics of the day, as well as those immediately pertaining to his own calling; he never knows that curse of luxury, *ennui*, nor that curse of extreme poverty, despair.

The intelligence of this class in America is one of the first things a foreigner remarks, in visiting the industrial establishments of this country. The picture drawn by our artist is true to the life. Nothing of the stolid, brow-beaten look, so apparent on the faces of foreign workmen, no consciousness of inferiority, no surly, morose expression, engendered by oppressive burdens and class restrictions, is found in the countenance of the American mechanic, as he sits by his bench at noon, feeding his mind as well as his body.

Our artist also has significantly placed in his hand a copy of the SCIENTIFIC AMERICAN, whose proudest boast is that it has done, and is still doing, more to instruct and improve American mechanics than any other paper published on the continent. An English cotemporary recently opened upon us the harmless batteries of its sarcasm, because we did not make it our exclusive aim to become the leading organ of the engineering profession in the United States. We have a broader field than this to cultivate, a far more useful work to perform, one which our critic can neither engage in nor sympathize with, namely, the education of skilled labor. We do not address our efforts to overseers and proprietors alone, or to rich and titled engineers; but to the hard-handed, hard-headed, and hard-working men, like those represented in the picture.

Let *Engineering*, which seems not to comprehend in the least the work we are engaged in, study this picture, and compare it with what it may see in any large manufacturing establishment in England, and it may have its eyes opened not only to our mission, but to the reason why we, with others, do not wish to see American labor degraded to the English level, from the effects of a mistaken free-trade policy.

The SCIENTIFIC AMERICAN is the friend of the American mechanic. It is for him chiefly its weekly repast is spread. It is to his intelligent appreciation that it owes its success as an industrial newspaper; and it can well afford to smile at the sneers and taunts of a foreign journal, which knows apparently nothing of the fact that there is one land on the face of this broad earth, where mechanics can hold up their heads as proudly as men in any other position in life, and whose average intelligence, education, and general information, is equal to that of any other calling, except those exclusively intellectual in their character.

To the American mechanic this nation must look, as one of the most important elements of its future prosperity.

"Full many a blank h's destined realm displays,
Yet see the promise of his riper days!
Far through the depths the panting engine moves,
His chariots ringing in their steel-shod grooves;
And Erie's naiad flings her diamond wave
O'er the wild sea nymph in her distant cave."

THE AMERICAN MECHANIC.

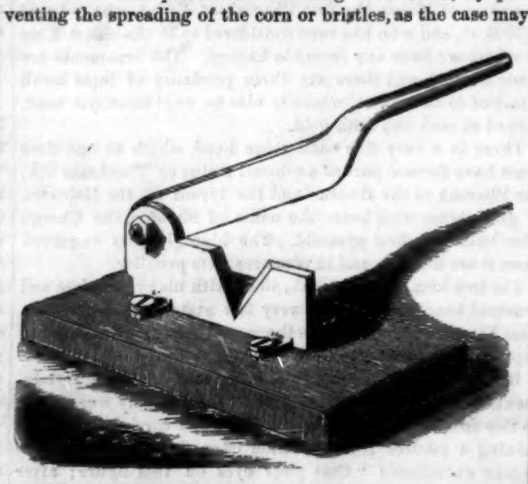
The First Daily Newspaper in England.

On March 11, 1702, the first number of the first daily newspaper in England, was published; and the contrast between the contents of the *Daily Courant* and the intelligence provided for the reader of to-day (says the London *Daily News*), furnishes a significant testimony to the alteration in public taste and public acquirements. The first daily newspaper was about the size of half a sheet of foolscap, and printed on one side. It contained neither leading articles, nor advertisements, nor home news. Quotations from foreign journals, and a couple of announcements concerning its own scope and mission, fill the number, which ends thus: "This *Courant*, as the Title shows, will be published Daily, being design'd to give all the Material News as soon as every post arrives, and is confined to half the compass to save the Publick"—we are almost afraid to say what the public of Queen Anne's day required saving from—"at least half the impertinences of ordinary newspapers."

Six weeks later, on April 24th, the *Daily Courant* appeared printed on both sides, its anxiety for "saving the public" having succumbed to the pressure of a column and a half of advertisements of books, and its "compass" becoming that of the "ordinary newspapers" it had sneered at just before.

SHEARS FOR TRIMMING BRUSHES.

The invention, patented by Charles Brombacher, of New York city, illustrated in the annexed engraving, is designed to facilitate and perfect the trimming of brushes, by preventing the spreading of the corn or bristles, as the case may



be, while trimming. The bed shear is formed, as shown, with a triangular opening, provided with cutting edges, and in it the brush is placed while it is cut. The pressure of the upper blade then causes the brush to converge, rather than spread, as would be the case were both blades straight.

Watering Streets with Chemicals.

Notwithstanding the skepticism that prevails in this country in regard to this method of watering streets, it steadily gains in favor abroad. The *Builder* (London) says the Westminster Board of Works, having determined to try the effect of the salts over the whole of their district during last summer, ordered 80 tuns, on the understanding that if they did not give satisfaction in every respect, a sum of £100 only should be paid to the patentee, but if the result proved efficient and economical, a sum of £200 was to be paid to the same person, and at a recent meeting of the Board a unanimous resolution was passed for the payment of £200: so we may feel assured the experiment has been a success. The parish of St. Luke, Finsbury, has also adopted this system of street watering, which is now in use in several provincial towns.

Compressed Air in Coal Mining.

The operations carried on in the Mont Cénis Tunnel long ago proved, in the most incontestable manner, the feasibility of employing compressed air in situations where the application of steam power was entirely out of the question. Some time before the successful completion of that gigantic undertaking, the attention of engineers was directed to the subject, and a practical result of their experiments is now to be seen in operation at the Holmes Colliery, near Rotherham. Numerous machines have been invented and worked, in a more or less successful manner, by means of which the power of water has been utilized in the getting of coal. And possibly, by the great advantage derived from its employment, compressed air will ultimately supersede all other methods at present in vogue among miners. In the Mont Cénis Tunnel it would have been almost impossible to convey high pressure steam to the excavating tools, for any considerable distance, without an enormous loss of power. Independently of this, supposing it practicable, the escaping steam and the heat would have made so confined a space simply unbearable. On the other hand, it was found possible not merely to convey the compressed air without appreciable loss of power, but also to ventilate the tunnel and keep the atmosphere of the workings comparatively cool, by releasing the air after the completion of its work. After a considerable number of experiments, Mr. Cooper has succeeded in pumping water from the above mentioned mine, and hauling the coal along the tramways—all attempts to accomplish the latter feat by means of hydraulic machinery having proved unsuccessful. Endeavors have also been made in various parts of the coal districts to apply this principle, with an average result of a loss of 75 per cent of power, arising, it is considered, from the employment of pipes of too small a diameter; but Mr. Cooper is convinced, by his experiments, that a power of 100 horses can be transmitted for a mile and a half, when pipes of sufficient size are used. The *modus operandi* at present in successful working consists in compressing the air by a powerful steam engine, operating two air pumps 20 in. in diameter, with a stroke of 3 ft., which communicate with a large receiver on the surface, the latter being connected, by 7 in. cast iron pipes, to three receivers in the mine, at a distance in this case of nearly a mile. The air thus forced into the receivers of the mine operates an air engine with two 14 in. cylinders, having a stroke of 12 in., and working two double action 5 in. force pumps, also with a stroke of 12 in. The discharge pipes have a length of about 3,000 ft., and a vertical lift of 300 ft., and are 5 in. in diameter. A uniform pressure of 25 lb. per square inch has been maintained for upwards of eight hours at a time, and, with the steam and air engines respectively working at the rate of fifty strokes per minute, nearly three gallons of water have been discharged per second. At the same mine, coal is now being hauled in the most successful manner by this machinery, and its application to the tools for cutting the coal is only a matter of detail, if not actually achieved at the time we write. Experiments are in progress, also, to ascertain the relative power given out by the air engine, when compared with the amount necessary to compress the air by the steam engine, trials being conducted at different velocities and pressures.—*English Mechanic.*

Women Telegraphers in Sweden.

Women telegraphers in this country are paid according to their skill, independently of sex. In other countries they are not so fortunate. The following, from an exchange, shows how they are treated in Sweden:

"Sweden employs women in her telegraph bureau, under very severe restrictions, however, which are not applicable to men. She must present a certificate from her parish priest, stating her age, and attesting her moral and religious character. She must have a clear and legible handwriting, and be acquainted with the main outlines of universal history, and of the history of Sweden in detail, as also with political geography, arithmetic (to decimals and the rule of three), the Swedish grammar, and so much of French, German, and English as may suffice to write and translate them into Swedish. The magnificent salary given her is from $100 to $140 per year, and she can retain her position as long as she remains single. The highest position she can ever hope to attain in the bureau gives her but $300 a year, and in order to achieve this she must wait years for a vacancy, and then pass a first-class examination in magnetism, electricity, and meteorology."

IT is said that if planks are cut in the direction east and west as the tree stood before cutting, they will not warp; but we think the statement doubtful.

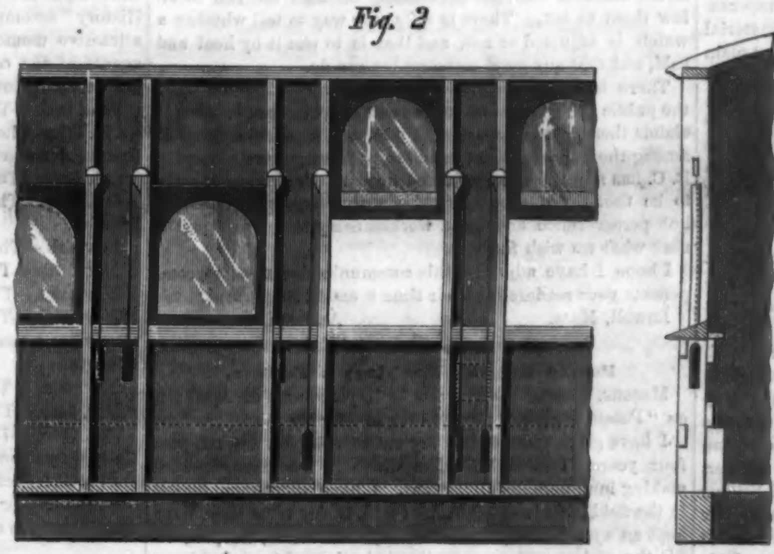
Glass Pulleys for Railway Cars.

On page 116, Vol. XX., we described and illustrated a glass window pulley, which was claimed to possess superior advantages over any window pulley hitherto introduced. The principle of the pulley was precisely the same as the ones herewith illustrated, but important changes have been made in the form of the pulleys, whereby they may be more readily and cheaply applied to ordinary windows, and also to the windows of railway cars.

These pulleys do not turn on pivots, but are fixed, the cord sliding in a groove. Being made of glass, the friction is light, so that the sashes are easily moved, while there remains just enough friction to compensate for the imperfections of balance between the weights and the sash. This is an important point, and upon it depends the application of the pulley to car windows. Hitherto the jar, of cars in motion, would either cause the sash to ascend, or fall, according as the weights or the sash preponderated; and it has been found impracticable to so nicely adjust the balance as to prevent this, without entailing too great expense and trouble.

Fig. 1 shows the form of the pulley used for car windows, and the method of its insertion into the stile. Fig. 2 shows the way in which the weights are applied. It will be seen that the weights are suspended in boxes below the rib of the car, and above the sill; and being fitted with sufficient nicety to the boxes, they make no perceptible noise in swinging about by the rocking of the vehicle. The weights are reached through a raised panel, covering openings through which access can be had to them, each of the boxes being thus provided.

Fig. 2

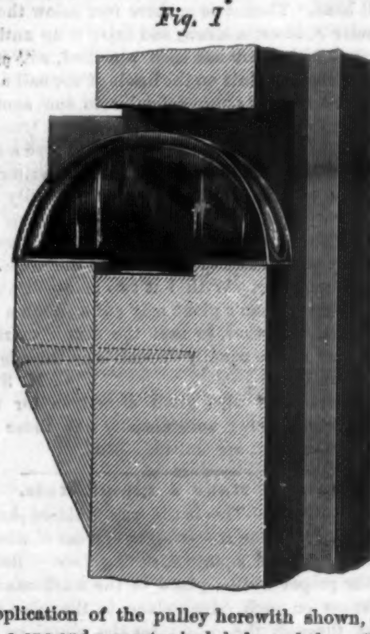


BICKNELL'S GLASS-WINDOW PULLEYS.

The conuenience of these pulleys will be appreciated by railway travellers, who have so often had their patience tried by broken or bent catches and spring fastenings. It is claimed that the entire cost of cords, weights, and pulleys, is no more than the cost of first-class springs; and that they are far less liable to derangement is very apparent.

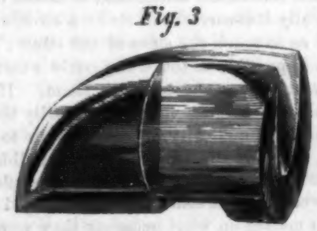
Fig. 3 illustrates the form of pulley used for windows of houses. The one formerly illustrated was flat, and its seat in the jamb required chiseling. Elegance of finish also required the use of an escutcheon, screwed over the mortise.

Fig. 1



In the application of the pulley herewith shown, only the boring of a one and a quarter inch hole, and the nailing of a supporting block to the back side of the stile, is necessary to prepare the latter for the reception of the pulley, which when inserted, gives an elegant finish. The blocks accompany the pulleys, and are bored so as to prevent splitting in nailing. In the application of the car pulley, shown in Fig. 1, the method of attaching the block is distinctly shown.

Fig. 3



It is claimed that the saving in cost of weights will pay for the pulleys. The latter require no screws and do not rust or squeak. The only cost for repairs will be the replacing of the cord when worn, and such wearing takes place so slowly that, we are informed, cords used for three years—as much as such cords are generally used in windows frequently opened and shut—show no signs of wear.

We are informed that these pulleys have been already extensively used, and numerous testimonials have been shown us, evincing that they are held in high esteem by those who have employed them. The inventor also informs us that two first-class passenger cars are now fitted up with these pulleys on the Eastern Railroad, between Boston and Portland, and that the company are so well pleased with them that they are applying them to their cars now building in Salem.

Address, for further information, American Glass Pulley Co., 30 Bowker street, Boston, Mass. [See advertisement on another page.]

Sheathing of Iron Ships.

At a recent meeting of the Civil and Mechanical Engineers' Society, of London, a paper was read by Mr. A. Forsyth Black.

The author first referred to the very serious evils of corrosion and fouling of the hulls of iron vessels, and the failure hitherto of compositions and paints to obviate these great disadvantages. After showing the loss to ship owners from diminution of speed, and the great cost incurred by them for frequently docking their ships, he proceeded to describe the plan of sheathing iron vessels with copper, invented by M. Roux, captain in the French navy, whose process has been applied to several of their armor plated ships. By this method, while great care is taken in the insulation of the hull of the vessel from its copper envelope, a very ingenious means is adopted for securing the sheathing to the plates of the ships. Holes are bored in rows, at about 2 inches apart, of a depth of nearly $\frac{1}{16}$ inch, and a recess is formed, of a greater diameter than the hole, by means of a spring rose bit. The rivets are formed with a base, a collar (in the middle), and a head, and a hollow set tool is employed for riveting them. To fasten one of these in its place, the head is inserted in this set tool, which bears on the collar, and the base placed in one of the holes. The head of the set is struck with a hammer, and the base of the rivet (which is of a semicircular hollow section at the bottom) fills up the recess in the hole, is firmly fixed, and the head projects. When all is prepared, the copper sheets are laid on, and the projecting heads of the rivets are riveted down.

He gave an account of the experiments that had been made by the Admiralty and others to test the efficiency of covering iron plate with zinc, and which had proved very satisfactory, especially when no insulating medium was interposed between the metals. This result might have been expected, he showed, from the position of zinc to iron in the electric scale of metals; just as iron is certain to be destroyed by contact with copper when salt water can reach both so placed, so is iron preserved by contact with zinc under the same conditions.

He then described Mr. Daft's proposed method of building ships, with a special view of providing a simple means for the attachment of zinc sheathing. That gentleman proposes to rivet all the plates of the vessel directly to the frames or ribs, and that the joints shall be made on the lap principle throughout, but in such a way that a flush surface shall be obtained. This he effects by leaving a space along the sides and ends of the plates equal to their thickness.

After the plates have been caulked against the joint strips from the outside, and then again plates from the inside of the vessel, he fills up the space with strips of compressed teak, to which he secures the sheathing with iron or zinc nails (by preference the former) of such a length that, on meeting the iron at back of the teak strips, the points turn round and are then clinched. He concluded by describing plans for applying zinc sheathing to ships built on the ordinary in and out strake system, by filling up the spaces between the out strakes by teak planks equal to their thickness. By this means a flush side is formed, and the sheathing can readily be nailed on, and the nails clinched, as shown above.

Pneumatic Tubes.

Pneumatic tubes, for transmitting small parcels, or "carriers" containing telegrams, are now in use between different offices in Paris and London. Twelve of the principal offices in Paris are connected by these tubes. The carrier consists of a brass box, shaped like a clock weight, placed inside a tightly-fitting case of hard leather. After many experiments, this form has been found the best adapted for the service. The messages are placed with addressed envelopes in the carrier, together with a list showing the number and destinations of the messages. The carrier stops at every office on the route, that messages may be taken out and others put in. Each office is furnished with a Morse instrument and line wire. There is one main circuit, 21,497 feet in length, two secondary, 17,350 feet and 16,617 feet, and a branch line 3,712 feet, making a total of 59,176 feet, or eleven miles. "The trains" start from the central station every fifteen minutes, stopping at five offices.

In London, two methods have been adopted: one consists of a circuit or continuous tube, leading from the central telegraph office to the general post office, and back to the starting place; the other of single tubes leading to separate offices. These tubes are of lead, about one and a half inches in diameter, and are inclosed in iron pipes for protection. The carrier is a small cylinder of gutta percha, covered with cotton. Two, or even three, are sent at the same time. The transit occupies about one half a minute through the longest tube, 3,600 feet in length.

A constant movement of the carriers is kept up in the circuit in both directions; they are placed in a loop of the main pipe, which is closed, a valve is opened into the main pipe, and by the same movement a column of compressed air is let in behind the carrier, which propels it through the tube into a similar tube at the other office Another carrier can at the same time be sent from the other office, the air being exhausted from the tube.

The single tubes are operated in the same way. The carriers are sent by pressure, and returned through a vacuum. One engine only is required, which is at the central office, and works two large cylinders, one of which is used as a reservoir for the compressed air, the other for the vacuum. A nearly uniform pressure of eight pounds to the inch is maintained. The tubes are easily worked, and are tended by boys.

Occasionally, in a rush of business, they become clogged, and the whole force of the compressed air is then turned into the pipe. If that be insufficient, a head of water fifty feet in hight is added, and the carrier forced through. All communications relative to the use of the tubes are made by signals on telegraph wires.

IMPLEMENTS FOR TRANSPLANTING FLOWERS AND PULLING ROOTS.

Our engraving illustrates three useful and neat implements for the transplanting of flowers. The first is the invention of H. Carmichael, of Rochester, N. Y. It consists of two trowel blades, having handles which may be pivoted together or used separately at the will of the operator. When pivoted together, plants may be removed from the loosest soil, without dropping the earth from their roots, and inserted in the place allotted them. All gardeners will appreciate the value of an implement which will enable them to handle the most delicate plants without injury.

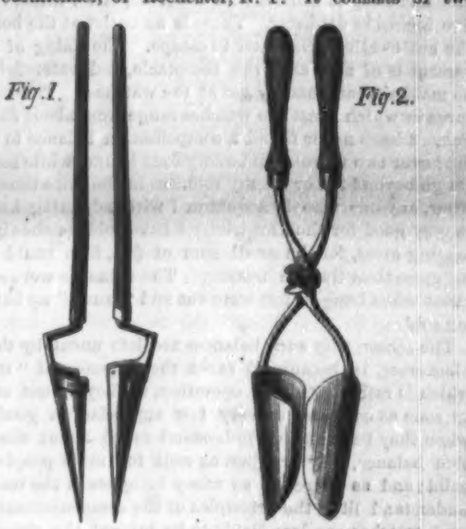


Fig. 1. Fig. 2.

Fig. 3.

The second device effects the same end in a slightly different manner. In this invention the handles are semicylindrical, and are held together by the grasp of the hand, or by a ring slipped over them. This implement is the invention of E. G. Nichols, of Beaufort, S. C. The third is the adaptation of a similar construction to the pulling of roots. The engraving explains itself, so that no description is needed. This implement is the invention of Baxter Wright, Cardiff, N. Y.

THE DESCENT OF MAN.—The favorers of the development theory have given us many points of similarity between men and monkeys, but our already dubious ancestry is now further complicated by Mr. Charles Darwin, who points out the identity of the "snarling" muscles in man, with those which display the teeth of a dog preparing for attack. Man no longer uses his teeth as weapons, but when he "snarls," he threatens to employ them so. This fact must have been observed by the Greeks, when they dubbed a sarcastic, bitter-tempered man a cynic, which word means doggish or doglike.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Popular Errors regarding the Watch Chronometer Balances---Reply to R. C.

MESSRS. EDITORS:—I read in your paper of March 4th, a communication of R. C., of Cleveland, Ohio, headed "Popular Errors regarding the Watch Chronometer Balances." Knowing his statements to be erroneous in the main, I answer him, in order that your readers may not be deceived in what he has said, and also, to do an act of justice to manufacturers of watches.

I can say, from experience, that an unadjusted compensation balance is better, by far, than a plain one of any material I have seen. Platina or platinum would make the best plain one, as its expansion and contraction from the effects of heat and cold is less than that of any other metal I know of.

Some balances are made of steel, with a brass band outside the steel rim, with screws set therein, and are in every respect chronometer balances, except, instead of cutting the rim so constructed entirely apart near the arms, of which there are generally but two, they are only cut about half way through, which is no better than not cutting them at all; and such a balance cannot compensate, as it is not allowed to act. It is worse than a plain steel one, as the brass forms a part of its diameter, and so it is affected more by heat and cold.

There are other balances made of only one metal, with screws in their rims, which are, in part, so constructed to take the eye, and also to bring the watch to time in springing, by putting in lighter or heavier screws, according to the tension or stiffness of the hair spring. A true compensation balance may be, and frequently is, timed in the same manner.

I have an apparatus for testing watches, which I believe is superior to anything else in use. The warm bath or box is so arranged that it is self-regulating as to the amount of gas required to heat the box to the proper temperature. This is done by the expansion and contraction of zinc rods operating a small poppet valve, adjusted by a screw, so that any required temperature may be had, regardless of the outside temperature. The freezing box is in the form of an inverted triangle, flat back and front, with a receptacle for the watches at the lower extremity, so that the melting ice may fall towards and keep in contact with the receptacle, which is about five inches in diameter. There is an outlet at the bottom of the box to allow the water to escape. The lining of the apparatus is of zinc, as is the receptacle, and water-tight; and no moisture can possibly get at the watches. The temperatures in which I test the watches range from about 35° to 95° Fah. I have never found a compensation balance to vary in time over two minutes in twenty-four hours; while some will not go beyond ten or twenty minutes in the same time, which latter, any one who is acquainted with adjusting knows to be very good for the first trial. I have sold watches in silver hunting cases, for the small sum of $18, that would not go out more than that in testing. The balances were solid or uncut when bought, but were cut and "trued" up before being sold.

The reason why such balances are left uncut by the manufacturers, is because it saves the expense of "trueing," which is rather a tedious operation, as they fly out of round as soon as cut; and as very few appreciate a good watch when they have one, or understand much about the expansion balance, they are just as well for most people if left solid; and as there are so many bunglers in the trade, who understand little the principles of the compensation balance, such watches are less liable to be injured, the more simple they are in construction.

I have cut a great many balances that had been carried for some time in their solid rimmed condition; and one in particular, which the owner had carried for over twenty-five years. This one did not vary over eighteen seconds in twenty-four hours heat and twenty-four hours cold, of the above named temperatures. I did not adjust this balance, but advised the owner to carry it just as it was; it is now over two years since, and he says it runs very much better than ever before. This watch was marked by the manufacturer "Patent expansion balance." How is that for fraud?

I have tested watches of a well-known manufacturer marked "adjusted," and found them to vary from four to eight seconds in twenty-four hours; and some of the same, not marked, that were adjusted at another place, that ran out of truth more than that.

Since reading R. C.'s article, I tested a movement of another celebrated establishment, and it ran out of truth only fifteen seconds in twenty-four hours. This grade of movement the makers do not pretend to adjust. I also tested an English lever movement with a plain steel balance, and it ran out of truth two hundred and forty seconds, or four minutes, in twenty-four hours. These two movements were in the same test at the same time. I once tested a plain composition balance with a worse result; I believe the variation was over five minutes in twenty-four hours.

All these tests were made by one of E. Howard & Co.'s best astronomical clocks, costing six hundred dollars; and there is no reason to doubt its truth. The trouble is with watchmakers who do not understand their own business. I have seen a watchmaker who had been at the business over twenty years, who had not the first idea of the the *modus operandi* of adjusting a balance.

One of a prominent firm in the business told a brother of mine that this baking and freezing of watches "did not amount to shucks;" he has since proved the fallacy of the remark by carrying a watch of my adjusting, which has not varied over three seconds per week for several weeks; yet this watch ran out of truth over thirty seconds in twenty-four hours at the first trial in the apparatus.

There is a great deal of "fibbing" done by the owners of nice watches as to the time they keep. Some talk of two tenths of a second per day, etc. Some men seem to have "fine time" on the brain; some will write certificates to get their names in print, and to let the public know they have a fine watch, the companies who publish them not being responsible for what is said, so there are two sides to the lying and swindling, if there be any. I have seen a great many watches marked "compensation balance," etc., that were not, and others that had compensation balances that were not marked. The only fault was in the "marked" ones, as the balances were not cut entirely through the rim to allow them to act. There is only one way to tell whether a watch is adjusted or not, and that is to test it by heat and cold, and that any good watchmaker can do.

There is no company in this country which imposes upon the public in regard to the expansion balance, except when it claims them to be "accurately" adjusted, as such a thing is among the impossibilities for *all* temperatures; consequently R. C. has never seen an adjusted watch. Perfection is only to be thought of—not reached—in time-keeping machines, but perseverance and good workmanship will come pretty near what we wish for.

I hope I have adjusted this communication so as to compensate your readers for their time spent in its perusal.

Lowell, Mass. ALVIN LAWRENCE.

Potato Digging Machines a Failure.

MESSRS. EDITORS:—The article in your issue of April 1st, on "Potato Diggers," prompts me to offer my mite.

I have given that subject my entire attention for the past four years. I have built five different machines, besides making innumerable alterations. I have spent each season in the field with trial machines; and, at the same time, have kept an eye on the progress of my co-laborers, keeping on file the claims and specifications of all machines that have been patented since 1853.

It may seem a little odd, that nearly five hundred patents should have been issued for machines to accomplish a particular object, and not one of them be able to do it successfully; but such seems to be the history of the potato digger.

The subject is an exceedingly difficult one, and very poorly understood by those who have attempted it. Most of the patents have been taken on models before any working machine had been tried. The tendency, as the Commissioner observes, is to two forms: one, a modification of the shovel plow; the other, a scoop and agitator, or carrier. The first may be light and cheap, but the second must be strong enough to carry 500 pounds of dirt, and hold the strength of a good span of horses, if brought up suddenly by a solid stone or other impediment. Consequently, it must be somewhat heavy and expensive.

My first machine was a scoop and endless open belt or carrier. Its four successors have been modifications of the same—each built larger and stronger. The last is a wrought-iron frame with four feet driving wheels, five inches face, with heavy lugs to give it hold to the ground. I have worked on soils, light and heavy, stony and free, wet and dry, with potatoes in hills and in drills, with large and small, live and dead tops; and have found the greatest obstacles (not where they have been generally supposed to be, in heavy clay soils, but) in sandy loam, where there is no hard pan, where weeds and vines grow deep, and where there is not sufficient resistance in the soil to hold them so that they will not pull up and foul the scoop.

My experience convinces me that machines can be made to dig potatoes and do it in a workmanlike manner.

H. B. NORTON.

Rochester, N. Y.

Explosive Oils and Lamps.

MESSRS. EDITORS:—While the subject of explosive oils and lamps is occupying a portion of your columns, I am disposed to crave your indulgence for a few remarks of mine. I notice a great deal is written in reference to the flame going down into the lamp. Now it is a question with me whether such an occurrence ever takes place; and my doubts are the results of experiments with what are termed explosive oils, or fluids. I have tried by every inducement I could conceive, to coax flame into vessels with narrow necks, and have failed in every instance.

I have used glass lamps exclusively, in my family, for over sixteen years; and during a portion of the time, used that very explosive compound, known as "burning fluid," and am in the habit of purchasing kerosene oil of various dealers, and it would be very strange if I had not, at some time, had some of the "doctored" article; and with all my experience, the only accidents that have occurred to my lamps are the breakages of chimneys.

In our family, we have always used loose wicks, so loose that they could be raised or lowered without difficulty. Your correspondent, signing himself "Lindon Park," suggests very tight wicks, a plan which, according to my philosophy, is very dangerous. With a wick that fills the tube snugly, particularly if it becomes gummed or incrusted (which it is liable to do), the lamp becomes an almost air tight chamber, where explosive gas is generated, with but little chance for escape.

Is it a great wonder that, under these circumstances, explosions take place? It seems to me almost impossible that it should be otherwise. The lamp once exploded, then comes the flame with all its horrible consequences.

I hope, Messrs. Editors, that nothing I have written will be construed as if I were in collusion with manufacturers of inferior or dangerous illuminating oils, for I have no interest in any oils or patent lamps, except so far as I represent a small family in their use.

Worcester, Mass. N. L. COOK.

The Balloon Postal Service During the Siege of Paris.

Messrs. Letts, Son & Co., of London, have forwarded us an interesting memorial of the late siege of Paris, being a *fac simile*, except the name and address, of a letter sent by the *ballon monté "Céleste,"* and with which this firm intends to supply the leading stationers in this country. The letter bears the postmarks and stamp of its original, and even the size and weight are identical. An epitome of "Balloon Postal History" accompanies the letter, the whole constituting a very attractive memorial of one of the most important historical events of the century. From the epitome alluded to, we gather the following statistics of the balloon postal service:

Sept. 30th.—The letter alluded to was sent per the *Céleste*.

Oct. 7th.—The *Armand Barbès* took M. Gambetta and the first carrier pigeons out of Paris.

Oct. 14th.—The *Godefroy Cavaignac* took out M. de Kératry.

Oct. 27th.—The *Vauban* fell near Verdun, in the German lines.

Nov. 4th.—The *Galilée* was captured by the Germans.

Nov. 12th.—The *Daguerre* was also captured.

Nov. 21st.—The *Archimède* fell in Holland.

Nov. 24th.—The *Ville d'Orléans (ballon monté)* fell in Norway, after a most extraordinary voyage, both for speed and adventure.

Nov. 30th.—The *Jules Favre* was lost at sea.

Dec. 15th.—The *Ville de Paris* fell in Nassau.

Jan. 28th, 1871.—The *Général Cambronne* was the last officially despatched balloon.

In all, 54 official balloons (conveying 2,500,000 letters), were sent out during the siege; besides many private ones, of which there is no record.

How to Prove a Plumb Level.

MESSRS. EDITORS:—I saw in your paper an article entitled, "How do you Prove your Plumb Rule?" The writer appears to have lost sight of the question, and taken in its place the query, "How do you make a correct plumb rule?" We wish to know how to prove what we have on hand. A quick way to prove one, is to drive a nail into a wall or post, leaving one inch projecting, and in such a position that a plumb and line may swing free of obstruction. Then let a delicate line be suspended so that it will touch the most prominent part of the nail head. Then, two or three feet below the nail, and exactly under it, insert a screw, and drive it up until the delicate line, to which a bob has been attached, will just touch the most prominent points on the heads of the nail and screw, and you have two points perpendicular to one another. To these points apply your plumb rule, which, if true, will correspond. This is a quick and easy way to prove a rule.

I do not think a rule constructed on the writer's plan is even likely to be true. Compasses are generally so easily moved in their joints, or there is likely to be some spring in them, even if supplied with a stay bar and set screw, that to invariably lay off two circles of precisely the same diameter, is next to impossible. With but two points on the face of the board, the workman's plane may cut a fraction deeper at one end than at the other, so that the center marks of the compasses may not be equally distant from the edges.

Union Point, Ga. C. M. STURGIS.

[Our correspondent also gives directions for making a plumb rule, which being substantially like those given by another correspondent, are omitted.—EDS.

How to Make a Plumb Rule.

MESSRS. EDITORS:—This is the way builders should make plumb rules: Plane the face straight and out of wind. Plane one edge straight and square with the face. Run a gage mark to the proper width; plane to the mark exactly; gage to a thickness on each edge; plane to the marks. Run a gage mark through the center for the plumb or cord line. Saw a hole in the bottom for the bob. Cut a saw cut in the top of the line for the cord; and a slanting saw cut each side of the center one, to fasten the cord into. Geometrically it is correct to "strike a circle at each end, and to plane so as to touch the sides of the circle;" practically, it is next to impossible to touch the circle exactly and have the rule exactly straight between them. If any do not believe this, let them try it. Theoretically the "circle way" is very pretty; practically, it would not do to "swear by;" at least, if some of the carpenters and builders here had to make their rules on the "tangent" principle, they would not do to swear by, and some of them I would not like to swear by, no matter on what principle they were made.

Paterson, N. J. JOHN HENRY.

THE EFFECT OF ELECTRICITY UPON BLOOD.—Professor Newman, of Königsberg, in studying the action of electricity upon the animal organism, has recently found that under the influence of powerfully induced currents, the white blood corpuscles of the frog swell up. Between their walls, which become very smooth, and the interior granular nucleus, a free space is left, and the granules of the nucleus manifest rapid movements.

THE HUM OF INSECTS.—The sound produced by insects has never been observed to possess any varied tones, or other peculiarities which would entitle it to be considered music. The Cicadæ, common in Greece and Italy, which can be heard for a mile, are cultivated and caged by the Chinese, a race whose ignorance of and want of taste for music of all kinds is strangely at variance with the rest of their national character.

To Tint Photographs Slightly.

The following easy method for tinting photographs is well adapted for persons who have little leisure for the other and more artistic manner.

Having prepared the photograph in the usual way, take a little pink madder or carmine, and lay it on the cheek with a clean pencil. Soften it carefully all round the edges, blending the tint into the face. Repeat the process once and again, until you have obtained nearly as much color as necessary; I say nearly as much, because you have to pass the general flesh wash over it, which has the effect of darkening it considerably. For the purpose of softening, it will be as well to have two pencils on one holder. It might appear that putting on the color of the cheek at once, and softening it, would suffice; but you will get it far softer by doing it with a very pale tint two or three times, than you possibly can by making it at once as powerful as necessary; besides, it is impossible to soften a strong color so well as a pale tint. When the color is quite dry, go over the whole of the face with the flesh tint, then put in the hair, eyes, eyebrows, and lips; round off the forehead with gray, and apply the same to those parts of the face where you observe it to be in nature. If your photograph be a very dark one, you will not require so much gray in it as if it were a light impression. Next wash in the background, and proceed with the draperies, etc.

Return now to the face: strengthen the carnations, grays, and shadows, by hatching delicate tints over them; put the light in the eyes, and the spirited touches about it, and the eyebrows, mouth, etc., and finish off the hair. In dark photographs, you will require to lay the lights on the hair with body color, as it is generally much darker than it appears in nature. Make out the linen with a gray, deepening it in the darkest parts, and lay on the high lights with constant or Chinese white. Proceed next to shadow the drapery, and when you have obtained the required depth, scumble in the high lights, using a bare pencil and a very gentle hand, as before directed. Give the background another wash, if requisite, and your photograph is finished; or make up a tint of orange vermilion and white, according to the complexion, and lay it smoothly over the face and hands; then put on the carnations with rose madder, and shadow up the face with orange tint, and proceed as above to finish. If the backgrounds and draperies appear dead, you may take a piece of very soft washing silk and rub them up a little, which will have the same effect as if they had been hot pressed. Whenever body color has been used, the rubbing will be ineffective. Neither rubbing nor hot pressing will give a shine to any but transparent tints. If there be metal buttons, chains, or epaulettes, they must be laid over the dress with body colors; a very good ground for them is red chrome and gamboge, shadowed with burnt umber, and hightened on the lights with lemon chrome and Chinese white. By the foregoing methods, it will be unnecessary to hatch or stipple a great deal; for you will find that the face will come out very soft and round without it, but the effect is far inferior to that produced by the other process.—*Photographer's Friend.*

Shellac Varnish for Furniture Etc.

This varnish has been employed by cabinet-makers upon their ware, but not generally as a finishing varnish. It has generally been employed, when much diluted, for the purpose of filling the pores of the wood to form a good body, previous to the application of copal or finishing polish. Shellac is prepared from a gummy substance deposited upon trees by an insect. Seed lac is more costly and better than shellac, being the select parts from the trees, free from many impurities which exist in the latter. Either kind forms a varnish when dissolved in alcohol, which alcohol should be a good article, say 0.80 to 0.85 sp. gr. This is the kind of varnish most frequently used by pattern makers, etc., but is hardly suitable for furniture or other similar articles, on account of its containing a yellowish coloring matter which injures the appearance of the surfaces to which it is applied. Cabinet-makers, therefore, employ a bleached solution of shellac, particularly for white or light-colored woods. The bleaching of shellac is generally effected on a large scale by chlorine or some of its compounds, or by sulphuric acid; the bleached article costs about 50 cents per pound, and the unbleached less than half this sum. The bleached shellac is frequently dissolved in spirits of wine, for use as a varnish by cabinet-makers. This varnish is quite apt to stain any inlaid metallic ornament upon the furniture, or any metal attached to it, in consequence of the varnish retaining a small proportion of the bleaching compound in solution. Another process of bleaching may be adopted, which renders the varnish free from this objection, and very much reduces the cost of the bleached article of shellac or seed lac. This process consists in the use of animal charcoal as a bleaching powder. It is prepared in the following manner: Any quantity of yellow shellac, previously broken in small pieces, is conveyed into a flask, alcohol of 0.83 sp. gr. poured upon it, and the whole heated upon the hob, or, in the summer, in the sun, until the shellac is dissolved; upon this so much coarsely powdered animal charcoal is added to the solution that the whole forms a thin paste; the flask is closed, not quite air tight, and left so for some time, exposed to the sun; and in eight to fourteen days a small sample is filtered, sufficient to ascertain whether it has acquired a light yellowish brown color; and whether it yields a clear, pure polish on light colored woods. If this be the case, it is filtered through coarse blotting-paper, for which purpose, it is best to employ a tin funnel with double sides, similar to those employed in filtering spirituous solutions of soaps, opodeldoc, etc. The portion which first passes through the filter may be preserved separately, and be used as a ground or first polish. Then some more spirit is poured over the charcoal upon the filter, and the solution used as a last coating. The solution of shellac purified by animal charcoal has a brown yellow color, but it is perfectly clear and transparent; when diluted with alcohol, the color is so slight that it may be used in this state for polishing perfectly white wood, such as maple, pine, etc., without the wood acquiring the least tint of yellow.

Shellac can be dissolved by an alkali, but it is rather a saponaceous compound, and it does not make a good varnish for resisting water. It is best to dissolve it in alcohol, in order to get a good varnish, and one that will combine with coloring matters for various purposes. By adding some lamp-black to alcoholic lac varnish, a beautiful varnish for black leather is produced.

Pennsylvania Iron Ore Beds.

The *U. S. Railroad and Mining Register* says: An important discovery has been recently made in Morrison's Cove, Blair county, in the southeastern corner of Central Pennsylvania, known by the local name of Leather-Cracker Cove. The Cambria Iron Company purchased, last year, a range of ore rights, on which shafts had developed a nearly vertical bed of solid brown hematite iron ore, from 22 to 26 feet thick, the outcrop of which runs along the outer edge of the limestone (Lower Silurian) formation which forms the bottom or central area of the cove, where the slates begin to form the base and slope of Tussey Mountain. The discovery of this stratum of ore was in itself of great importance, and cast new light on the vexed question of the law of our brown hematite deposits; helping much to explain the appearance of large bodies of ore in similar situations in other parts of the State, for example at Mount Pleasant mines, in Path Valley west of Chambersburg; and giving us a very sure clue to the discovery of other deposits, on the same geological horizon, now entirely concealed.

One of these shafts was 52 feet deep. To drain it, a tunnel was commenced at the creek in the bottom of the cove, 250 yards distant, and driven towards the shaft, which it struck at a depth of 45½ feet from the top, or surface. For 213 yards this tunnel passed through a succession of limestone rocks, standing nearly on edge. It then suddenly entered a mass of ore, wholly unexpected. For 72 feet it passed through this ore, so hard that gunpowder was used all the way. To learn more of this mass, a 37½ feet deep air shaft was dropped from the surface to the tunnel. The first 18 feet of the shaft went through loose ore; the rest was as solid as that passed through in the tunnel. After passing through the ore, the tunnel was driven 5½ feet through yellow clay and then entered the 26 feet ore bed, to drain which it had been originally projected. Here, then, we have a double bed of solid brown hematite iron ore of the amazing thickness of 103½ feet, with a parting of 5½ feet of yellow clay.

This gigantic ore bed descends, with regular walls, at a nearly vertical inclination, and to an unknown distance, under the roots of the Tussey Mountain. If continued eastward, between the limestone and the slate formations, it must rise, between the limestone and the slate, in Path Valley and the great valley of Chambersburg. This it actually does at the Mount Pleasant furnace mines. There is good reason then to believe that it underlies the whole intervening country, but at depths which are sometimes enormous. For, under the Broad Top coal region, it must lie at a depth of four or five miles that being the space occupied by the Lower Silurian, Upper Silurian, Devonian slate, and sandstone and limestone formations from No. III to No. XII. Whether the ore holds any like its Leather-Cracker size the whole distance, will never be known; but all analogy teaches us that its thickness will vary all along the line, and vanish to nothing under certain areas. Whether this remarkable deposit runs underground in a straight and narrow belt from Leather-cracker Cove to Path Valley, or spreads about in all directions under Broad Top, Huntington and McConnellsburgh country, ramifying and reuniting like the water lagoons in a swampy district, we shall never learn: for the ground, for the central portions of the ore area, lies far below the reach of boring tools. But the outcrops of the ore around the sides of Morrison's Cove, and the outcrop of ore for twenty miles in Path Valley, show that the belt of deposit is a broad one; while the presence of great deposits of ore, in exactly the same geological position, as far away as the country between the Schuylkill and Lehigh rivers, proves the immense outspread of the general deposit.

It may help our readers who love the iron science to get rid of the old "pocket" prejudice respecting brown hematite ore, if we add one more item to our description of the Leather-Cracker bed. On the opposite side of the Cove, the limestones and slates turn over and go down nearly vertically in the opposite direction, that is west. Here shafts have been sunk to the depth of a hundred feet on the 26 feet ore bed, and it is found quite regular. Several miles further south the dip turns, and the bed comes up again all right. Search is now being made for the great lower member of the bed on that side.

IN the chief operating room of the Western Union Telegraph Company, New York, and performing part of its regular routine service, is an operator only fourteen years of age. He was educated by Mr. Westbrook, of Wilmington, Del. when only eleven years of age, and at that age was placed in the service at Cape May. From thence he took charge of the office at Princeton, N. J., and during the strike went to Washington, D. C., performing there the full service of a veteran operator. This boy, whose name is Benjamin Johnson, is an easy and rapid penman, can transmit easily 2,000 words an hour, has the manner of riper years, and has a pleasant courteousness which is indicative of self-respect and companionliness.—*Journal of the Telegraph.*

Magnetic Engines—Their possible Duty.

In view of the recent extravagant claims made by persons interested in Payne's new magnetic motor, to which the attention of our readers has been called, the following calculation, from the "Journal of the Franklin Institute," will be of interest:

Attention has been drawn lately, in some of the public prints, to one or more forms of magnetic or electric engines, claiming to develop an available and economic motive power. It may be, therefore, of interest, or even of use, to put before our readers, in a few words and figures, the possibilities of invention and improvement in this direction.

The total mechanical equivalent of a pound of pure carbon, consumed with oxygen, is $7,900 \times 1,390 = 10,891,000$ foot-pounds; or, in other words, one pound of pure coal burned in one minute would, if applied with absolute economy to the development of motion, exert a force of $10,891 \div 33 = 333$-horse power during one minute; or, if burned during an hour, would exert $333 \div 60 = 5\cdot5$-horse power during the hour; or, again, each horse power would require $1 \div 5\cdot5 = \cdot18$ of a pound of coal per hour, nearly, or say $\frac{1}{5}$ pound. Now, as a matter of fact, a good engine and boiler does develop a horse power for each 5 pounds of coal consumed, being about $\frac{1}{25}$th, or say 4 per cent of what it might do if a perfect machine. This shows us that there is a large margin for improvement in reference to the duty of our steam motors, and that if, in any other manner, chemical force be converted into motion in a less wasteful way, some increase in the costliness of the fuel may not be inconsistent with economy. But this, like any other problem, has its limits, and these it is our purpose to define.

The total mechanical equivalent of zinc is $1,301 \times 1,390 = 1,808,390$, or, in other words, a pound of zinc consumed with oxygen in one minute would, if applied with absolute economy to the production of motion, develop a force of $1,808,390 \div 33,000 = 55$-horse power during that time; or, during one hour, $55 \div 60 = \cdot91$, or, say, 1-horse power.

Or, in other words, zinc, being consumed in such a way that its total useful effect should be applied without any loss whatever, would, weight for weight, be about five times as effective as coal in its present wasteful manner of consumption. When, then, zinc is less than five times as costly as coal, and a perfect battery and electric engine have been invented, these will compete favorably with the steam engines of the present day.

With reference to some statements that have been published, it may be interesting to note that, from the above data, it is evident that with a perfect battery and engine, to develop 2½-horse power for ten hours, would demand the consumption of 27·4 pounds of zinc.

The same journal also has the following article on

THE MAXIMUM OF MAGNETIC POWER EVOLVED BY A GALVANIC BATTERY.

A curious succession of papers on the above subject has appeared lately in the *Chemical News*, from the Rev. H. Highton, in which that gentleman attacks no less important a principle than the conservation of force, and maintains no less difficult a thesis than the possibility of what is technically called perpetual motion, or the development of power without a corresponding expenditure of force. The subject would hardly be worthy of our notice but that, strange to say, these opinions have gone, so far, unchallenged in the pages of our learned cotemporary; and, in connection with schemes alluded to in the above item on galvanic motors, seem to have led astray some investigators.

The theory of the daring author above named, is briefly thus: A battery current, passed through a given electro-magnet, will lift a given weight; if, now, we double the cross section of the wire of said electro-magnet, and also its length, the resistance of the circuit remaining the same as before, the current developed by the battery and the consumption of zinc will remain as before, and yet the lifting power of the magnet will be doubled. Or, in place of increasing the size and length of wire, several similar electro-magnets may be so introduced into the circuit as to produce the same effect. Such a process continued indefinitely would, of course, enable us to develop any amount of magnetic force from a given battery.

So far, well; but we have not yet come to the development of power, which implies motion. For this, it is evident that the electro-magnet must be charged and discharged, and here comes the compensating condition. To charge a double length of wire will take just twice the time, and therefore cause a double expenditure of zinc in the battery.

Our author, in fact, notices this, but remarks that "the electric current is so rapid that this difference of time is inappreciable within any practical limits." Without doubt, to advocates of perpetual motion, but not to those who can see that two millionths of a second are as much twice one millionth as two centuries are twice one; or to the zinc, which, having to work twice as long at each effort, will be doubly exhausted when a given number of actions has been completed.

A CASE of elephantiasis is trying the skill of the medical faculty at Waterville, Me. In this disease, which is very rare in this country, the patient's legs are swollen to an enormous size, the skin becoming hard and rough, and suggestive of the lower extremities of an elephant.

THE WILLIAMS COLLEGE scientific expedition to Central America has been quite successful, and brings back valuable contributions to nearly every department of natural history. Among the most important of their collections are three hundred new specimens of birds and four hundred of insects.

Improved Animal Power for Churning, Etc.

Domestic animals, such as sheep, dogs, and the like, may be made to perform much useful labor, by the use of proper appliances. It is obvious, however, that a machine, designed for light animals of this kind, should itself be so constructed as to consume the least possible amount in friction, and enable the animal employed to exert its strength to the best possible advantage. Simplicity, durability, and cheapness are also indispensable in a machine designed for general use; and if, with these advantages, portability be also combined, such a machine might, we think, secure a large market among agriculturists, who can find many uses, about the farm, for such a machine, beside that laborious one of churning, for which such a power would find its most important place. A machine which seems to possess these requisites is shown in the accompanying engraving.

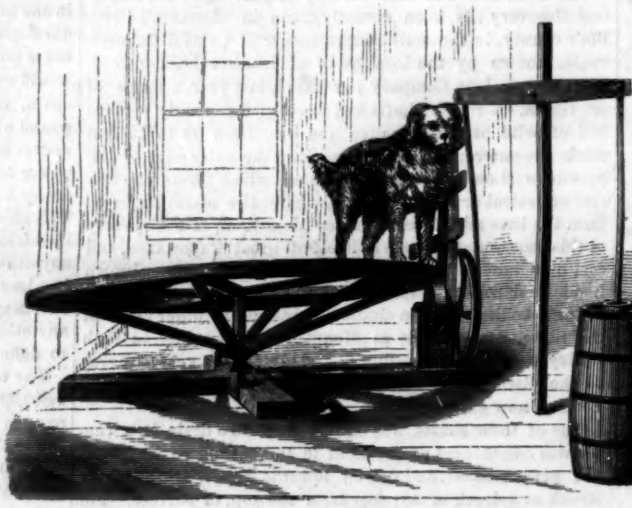
It consists of a wide rimmed wheel upon which the dog, sheep, or goat travels, its central bearing being a sleeve, which runs on an inclined spindle. The inclination of the spindle may be adjusted to the weight of the animal, as its foot is a cross-bar resting in slotted supports, which may be raised or lowered at will, and set so as to incline the cross-bar.

The edge of the wheel rests upon a friction wheel, as shown, or it may be toothed, to drive a pinion if desired.

To the shaft of the friction wheel, or pinion, is affixed a fly wheel, and from a crank pin on this wheel, the power is transmitted to the churn.

The whole can be taken to pieces, and packed in a very small space for transportation. When wanted for use, it can be set up in a very short time.

A patent on this machine was issued to J. H. & G. Hawes, of Monroeton, Pa., January 10, 1871, through the Scientific American Patent Agency. For further particulars, address the patentees as above.



SMALL ANIMAL POWER FOR LIGHT PURPOSES.

Death of Professor Augustus de Morgan.

We regret to have to announce the decease of one of the most eminent mathematicians and logicians of the present century. Augustus de Morgan was the son of an officer in the East India Company's service, and was born in India, in the Madras presidency. He entered at Lincoln's Inn, London, with the intention studying law, but abandoned the idea, as the mathematical chair in University College was vacant; and he obtained the honor of the appointment in 1828, he being then twenty-two years of age. He resigned a few years ago, in consequence of the university authorities refusing to install Professor Martineau, as professor of logic, on the ground of his religious belief.

As a teacher and writer on all branches of mathematical science, Augustus de Morgan's reputation was world wide; and he was well known as an actuary of extraordinary talent, although he had never been connected with any life office. Moreover, his knowledge extended to every field of science and literature, and his mind and memory were prodigiously acute. He recently published, in the London *Athenæum*, a series of papers entitled "A Budget of Paradoxes," in which he demolished crowds of circle squarers, perpetual motion seekers, and other monomaniacs, with a scathing wit and humor, and a power of logic and learning, illustrated by quotations from and references to writers of all ages, from the oriental Shasters and Egyptian hieroglyphics down to the smallest ephemeral writers of our day. He was a member of all the chief scientific societies in his own country, and was well known and honored on the continent of Europe. His place in the world of science and in literature will not easily be filled.

SPITTOON FOR INVALIDS.

This is a very convenient and useful appliance for the sick room, invented by J. M. Cayce, of Franklin, Tenn. The improvement consists in providing the handle with a system of

levers by which the lid is opened. The hand, in grasping the handle, presses the button on the first of the series of levers which operates the lid, and the lid falls shut by its own weight when the button is released from pressure.

Names of our Children.

It appears from calculations, that two thirds of all the children in England and Wales are called by one of the following twenty-five names, in the following order:

Order.	Name.	No.	Order.	Names.	No.
1	Mary	6,819	14	Jane	1,697
2	William	6,300	15	Ellen	1,621
3	John	6,230	16	Emily	1,615
4	Elizabeth	4,617	17	Frederick	1,604
5	Thomas	3,878	18	Annie	1,580
6	George	3,630	19	Margaret	1,546
7	Sarah	3,602	20	Emma	1,540
8	James	3,000	21	Eliza	1,507
9	Charles	2,323	22	Robert	1,328
10	Henry	2,060	23	Arthur	1,2 7
11	Alice	1,825	24	Alfred	1,232
12	Joseph	1,780	25	Edward	1,770
13	Ann	1,718			

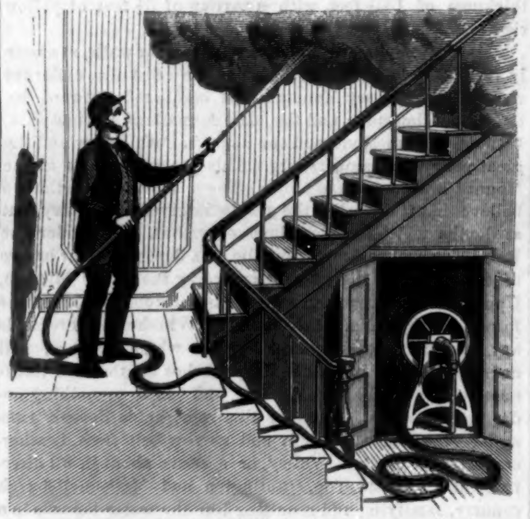
Total No. of children (out of 100,000) registered under the above twenty-five names.........65,898

Add "Richard," "Peter," "Charlotte," "Lucy," and one or two more, and we shall have the whole list of names with which the masses of the English people are familiar. They have not apparently, in all these years, invented, so to speak, one name of their own, as the Germans have "Hermann," and the French "Jacques," but have been content to name almost everybody after the Virgin, or a saint or two, or some English king, or king's son or daughter. No English forname is distinctly of the people. Nothing so quaint as the adoption of the Old Testament names in the way in which Connecticut has adopted them has ever been popular among them; they have liked no Roman names, have forgotten all British names, have, in fact, stuck to their usual text, that some big person must use a name before they can find the courage to do it. "Alice" seems as old as English history, "James" occurs in Doomsday Book, "Robert" is Teutonic, and very old, and "Mary" of course is the pre-eminently Catholic name; but for the rest, every name seems to have derived its popularity either from some saint or some English king.

HOSE REEL FOR FACTORIES.

The accompanying engraving shows a hydraulic apparatus, recently patented in England, and designed to be fixed in public buildings or manufactories, for extinguishing fires.

As will be seen, it is very simple. A drum is mounted on a frame, and a hollow axis is brought through the center of



the same into a gland or stuffing box. It may also be connected to steam and other fire engines, or used in connection with waterworks, force pumps, etc. The advantages claimed for the apparatus are, that any quantity of water and piping can always be kept ready for use in a building, while the annoyance and delay of uncoiling and connecting the pipe together, when every minute is of great importance, is obviated.

Flexible Rock--Itacolumite (Articulite).

The attention of scientists has recently been again directed to the structure of this singular flexible rock, by an article in the *Chemical News*, from the pen of Prof. A. M. Edwards. The labor of Prof. E., of which the article in question is a summary, was undertaken mainly to examine and confirm the results obtained in 1867 by Prof. C. M. Wetherill, after a microscopic examination of the rock. The last named investigator determined the flexibility of the itacolumite to be due to "small and innumerable ball and socket joints, which exist throughout the mass of the stone very uniformly," and proposed for it the name of "Articulite." Prof. Edwards' examination resulted unfavorably to this view of the subject; and it is in reply to his paper, above referred to, that Prof. Wetherill published another note on "Itacolumite" of which the following is an abstract, given in the *Journal of the Franklin Institute*:

In respect to the joints, it may be said that:

1. Each ball and socket does not admit of a great play, and is not smooth and perfect like that of the joint of a limb; it is, notwithstanding, perfect in principle of motion.

The stone is built up of grains and congeries of grains loosely coherent, and forming irregular cavities, in which are engaged projecting parts of other congeries of grains of sand which are susceptible of a slight motion in the cavity—in some cases in one direction, and in others in several or in all directions. This freedom of motion is of the true quality of a ball and socket joint.

2. The motion is *not* most "marked in a direction at right angles to the lamination." It is certainly so if a piece be taken of which the thickness is small in proportion to the other dimensions; but that is not the method by which the true motion is shown. A properly made section is susceptible of as much motion in the plane of lamination as at right angles to such a plane.

3. The proof of the nature of the joints does not rest solely upon the microscope, although that alone is sufficient. The motions of the cylindrical rod afford an independent and equally convincing demonstration of its ball and socket character. There is no other kind of joint which could explain the motions of which this rod is susceptible, namely: "It can be *compressed* and *elongated* in the direction of its axis, the extent of motion being a little over ½ a millimeter. When one end is fixed, the other end may describe a circle of 34 millimeters diameter, and may be made to touch every point in the area of the approximate spherical zone. The rod can also be twisted about its axis, the torsion being 10°. I may add that, by shaking the rod near the ear, one may hear the clicking of the joints, as the motion is arrested at the limit of their greatest play.

The nature of the curve (nearly a catenary) when the rod is supported by its ends, agrees with the joints which I have described, and confirms also the revelations of the microscope.

I have never seen anything so wonderful as this rod of itacolumite. When held by one end upward, it totters in all directions, so that no one, seeing it at a short distance, believes that it is a stone. A gentleman from California, to whom it was shown, suggested jocularly that it would do well to build houses with, in his earthquake shaken State.

Indeed, I have no doubt that a sufficiently high and thin well built wall would be susceptible of a decided motion before cracking. The height of wall, so much greater than its thickness, would permit the play of the innumerable small joints, existing from the bottom to the top, to be perceived.

In order to see the joints, a thin section, supported at one or at both ends, may be moved, while under the microscope, with a needle point; by changing the position of the section, a part may be reached at which the play of the joints may be perceived. They can also be seen by dissecting a flexible piece of the mineral, using either a fragment or a surface rubbed flat. The surface to be examined is inverted, tapped, and as far as practicable, brushed from loose grains. It is then examined under the microscope with a power of 40 to 60 diameters.

The attention of the observer is first attracted by the irregular pits or depressions formed by grains of sand. By very delicate touches with a fine curved needle point, the surface may be investigated; loose grains of sand are seen and removed. Touching other grains and congeries of them delicately with the needle, proves that some have motion in a cavity formed of grains of sand cemented together. These are dissected out, and other movable groups are found. Some have less motion than others, and some are immovable By patient investigation of the mineral in this way, the observer will rise satisfied that it is made up of joints of the character described.

DEVICE FOR SALTING AND SEASONING MEATS.

Cooks have experienced the difficulty of uniformly seasoning large joints of meat. While the outside will be incrustated with salt, the interior is often so fresh as to be quite insipid. The device herewith engraved, is constructed somewhat on the principle of a surgeon's trocar. It consists of a sheath, containing a puncturing instrument. The whole being thrust deeply in the meat to be seasoned, the puncturing instrument is withdrawn; and the salt, pepper, or other

seasoning can be conveyed to the interior of the joint through the sheath.

This device was patented by Warren Sadler, of Lockport, N. Y., in April, 1867.

Porcelain Process and Collodion.

A correspondent of the *Photographer's Friend* says: Coat a porcelain plate with collodion, sensitise in the negative bath, the same as proceeding with an ordinary negative, place it, when coated, in the plate holder, then take any negative you wish to make a picture from (one not too intense is best). Curtain a window with dark paper or cloth, and cut a small opening the right hight for the camera. Put your negative in the opening cut from the curtain, and make a picture on your porcelain plate, as the case may require, large or small. the same as if copying a picture; develop, then wash, fix with cyanide, and tone with gold, mercury, or sulphuret. Wash, dry, color, and varnish. Exposure from five to thirty seconds.

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Contents:

(Illustrated articles are marked with an asterisk.)

THE SUEZ CANAL.

When the Suez Canal was opened to traffic, there were numerous prophets throughout the world, who predicted it would prove a commercial failure, and there were not wanting those who prophesied that the drifting sands would obstruct the passage so much that engineering skill would be taxed to its utmost to keep the channel clear, at a cost within the receipts from tolls.

The canal has now been in active operation a year, and, it is stated, its receipts exceed its expenditures by $160,000 in gold, which, although it would make only a small dividend on the capital invested, is still a profit, and the fact is significant of permanent success, especially when considered in connection with the increasing steamer traffic.

For some reason, sailing vessels do not favor this route as yet, and the receipts are almost wholly from steamers. The opening of the canal has given rise to the construction of a large number of the latter named vessels, especially designed for the Suez route.

During the period for which the canal has been used for trade, there have been no serious obstructions whatever. The supply of water has been ample: the banks have maintained their integrity, and, in short, the entire category of ills, so confidently predicted by the sceptical, have not yet manifested themselves.

But while the canal has proved an engineering success, and, to an encouraging extent, a commercial success, it is still laboring under the burden of serious financial embarrassment.

The situation financially possesses some peculiar features. Its owners are of four kinds or classes: the shareholders, holding £8,000,000 of stock; the Khedive, holding £4,000,000; a small class, holding a kind of preferred stock under peculiar conditions, which we need not dwell upon here; and the debenture holders, whose debentures are £4,000,000, and guaranteed a dividend of five per cent. This dividend, amounting to £200,000, has only £32,000 to meet it, and the directors are in the condition of the breathless German flute player, who did not know where the wind was to come from.

More money must be raised somehow. France has none to spare, and England seems the only source whence it can be obtained. If M. Lesseps triumphs over the present difficulties of the situation, the world will accord him the honor of being the best financier, as well as one of the best engineers of his time.

But how is the money to be got from England? The present profits of the canal do not make it a desirable investment; the prospective profits *may*, provided the canal be made the means of enlarging the British possessions.

There is not a shadow of a doubt that this thought is taking daily more and more definite form in the minds of far-seeing Englishmen; and we are prepared to see the great Suez canal become substantially British property, notwithstanding any objections the Khedive may make, or any feeling the French government may have against such a scheme.

A KNOWLEDGE OF COMMON THINGS.

It is not a knowledge of abstruse and difficult questions that we need, so much as a familiarity with the every-day affairs of life. The number of persons who attain to eminence by the extent of their information is necessarily small. Their heads tower above others, like the peaks of mountains, and their names are in every person's mouth. They are the exceptions, and not the rule. It will be observed in studying the history of the world, that the great mass of people, who represent the valleys, have been raised by the progress of discovery and invention, until the common man has, at the present age, attained a hight that was formerly considered inaccessible, except to the scholars by profession. The man who excels must go vastly higher now than he was compelled to do in the time of Plato and other philosophers, about whom our learned pundits tell such marvelous stories. In fact, Liebig says: "Our children have more accurate perception and understanding of nature and natural phenomena than Plato had, and they can laugh at the mistakes made by Pliny." But there is no denying the fact that a knowledge of common things is sadly needed in every community; and we must take care that children of a future generation do not turn the laugh on us. We are led to these reflections by the occasional receipt of letters asking questions, the answers to which ought to be known to the veriest tyro in science. We are always glad to answer questions, and many of our correspondents favor us with valuable information, or start topics that lead to important investigations. Now and then some one asks a question, very much as if he were to inquire if water commonly runs up hill, or something equally absurd. We receive specimens of minerals, such as quartz or rock crystal or feldspar, desiring an analysis to be made, and inquiring if they contain precious metal? We are asked if a perpetual motion be possible? What are the constituents of water? Can it be rendered combustible by being passed through iron grates? Does the air have any weight? Can water be compressed? And so on through a long list of questions, upon subjects that ought to be common property with every one who has attended public school.

We think that teachers and professors commit the mistake of aiming their instruction too high. They take it for granted that their pupils know more than they really do, and omit just the common things about which we are complaining that there is too much ignorance. If we begin at the top, and raise the roof of a house, that does not help the foundation. It is better to see first to the cellar and basement, and build up strongly from the bottom; we can then add to the structure as much as we please, and those who have the leisure and the means may go up as high as their inclinations may lead them. Arithmetic must precede algebra, mineralogy properly introduces geology, spelling goes before composition; things ought to be taken in their natural order, and jumping over the "Slough of Despond," or tunneling the "Hill of Difficulty," will not do.

The merchant who introduces a new style of goods must, first, by advertising and in various ways, create a demand for what he has to sell. People must learn to appreciate and value the new articles. It requires very little preliminary education to accomplish this, but the invention of a new machine, involving a knowledge of the first principles of science often meets with great obstacles on account of the ignorance of the community. Such an inventor is said to live before his time. If he had been born a hundred years later, he would have had no difficulty in introducing his invention. The best illustration of this argument is afforded in the history of the steam engine that Papin tried to induce the Government of Hanover to permit him to apply to vessels navigating the river Weser, at a period when there were probably not half a dozen men on the globe who possessed enough knowledge of physics to appreciate the invention. At the present time, a school boy can buy for a dollar a more complete engine than the wisest mechanic could have constructed a hundred years ago. A knowledge of the properties of steam has become universal at the present time, and Papin would have the whole nation to sustain his demand, were he to return to earth and make it now.

The question arises: Are there not probably Papins of the present day? The list of patents published by us affords to the reflecting mind abundant material for inquiry. Some one who is in advance of his fellows makes a discovery, and offers it to the world for a reasonable sum. His offer is not accepted for the reason that the small amount of knowledge, required to appreciate it, is wanting. He must wait, or, as is frequently the case, has the mortification of seeing his discovery appropriated by some one else.

We spoke of quartz crystals as having been sent to us for examination and report. Now, it ought to be known that the crust of the earth is more largely made up of silicon than of any other element excepting oxygen; and yet more information can be obtained in our text books about such rare elements as selenium or tellurium, than about silicon. The commonest stone we have, the element silicon that is everywhere disseminated, is a profound mystery, and we do not apply it in the arts on account of our ignorance of common things. The alloy of silicon with copper is said to be harder than steel, but not more than two or three chemists have ever made it. Here is a metal that we stumble over every time we take a walk, and yet common as it is, no one knows how to use it.

What we want is evidently not so much an increase of knowledge as the universal dissemination of facts already known. All scientific men will bear testimony to this. If no new discovery were to be made for the next ten years, the world would not stand still, but would have time to take an account of stock, and to apply the many useful things that are now slumbering in the hands of the few who know about them.

We say to our friends the teachers and writers: Do not soar too high, but keep down to the level of the masses, and help us to a knowledge of common things.

BISULPHIDE OF CARBON.

Thirty years ago a pound of bisulphide of carbon cost $5; it is now manufactured in France at 5 cents a pound. The uses of this important article have increased in the same ratio as its cost has diminished. It is now made in perpendicular retorts, built of the same material as the glass-house pots. These are glazed inside by a mixture composed of 20 parts soda and 12 parts boracic acid. They are 1·8 meters high, and ·5 meter interior diameter. A bench of four retorts is put in each furnace, and generally lasts, with careful usage, six months.

Every three minutes, 155 grammes of sulphur is introduced, which, in the course of twenty-four hours, amounts to nearly 50 pounds. The sulphur burns, in glowing coals, to form a vapor, which is condensed into a liquid in zinc coolers, and is collected under water. A cherry red heat is required for its formation, and the crude product is further rectified by distillation in a steam bath.

The bisulphide of carbon is a liquid at ordinary temperature, while the corresponding binoxide of carbon, or carbonic acid, requires great pressure and cold to reduce it to a liquid. The bisulphide of carbon has recently been converted into a snow white solid, by passing a rapid current of dry air over its surface. The sudden evaporation thus produced has proved sufficient to solidify it, although it has hitherto resisted even so low a cold as −90° C.

In the course of manufacture a good deal of sulphur goes over, and is dissolved in the bisulphide; and sometimes as much as 15 per cent is reclaimed by rectifying the product. The manifold uses to which the bisulphide of carbon has been applied of late years have made it one of the most important of our chemical products. It is the best agent for extracting oil from press cake or from any other source. Near Berlin are extensive oil factories, where the extraction is accomplished by this chemical means. The most extensive application of the bisulphide has been in the vulcanization of india-rubber; it is used for this purpose in association with a small quantity of chloride of sulphur. Linen rags which have been used to wipe machinery, are cleansed, and the oil saved, by digesting in the bisulphide of carbon. Its effects upon the lower forms of life are analogous to those of carbolic acid. It destroys the larvæ of insects, and has hence been extensively used to destroy vermin. For the extermination of the weevil in wheat, a small quantity of the liquid, put in a saucer and placed on a beam in the granary, is found to be very efficacious. It is a valuable solvent for sulphur, iodine, and many substances not soluble in water. Dr. Gibbs recommends a solution of phosphorus in bisulphide of carbon as the best liquid for filling prisms in experiments upon light, as it possesses high refracting power, much superior to the best flint glass.

The bad odor of bisulphide of carbon can be removed by distilling it off scraps of metal, and repeated rectification; it is then very much like an ether, and can be used to extract the principle from pepper, ginger, coffee, and spices, in the manufacture of condensed food. It could be employed in the preservation of meat, if it were not for its disagreeable odor.

EFFECT OF COLD ON IRON AND STEEL.

The researches of Joule, Fairbairn, Spence, and others upon this subject have excited considerable discussion, and attracted much attention. Mr. Joule, whose experiments were somewhat severely criticised as puerile in character, being performed with nails, darning needles, etc., has publicly replied to his critics: that he believes the size of the bars experimented with, has nothing to do with the principles involved.

Mr. Spence has been performing further extended experiments, being led to do so by the indecisive character of all the experiments brought to the notice of the Manchester Literary and Scientific Society, through the papers referred to in our recent article upon this subject. The new experiments of Mr. Spence were deemed by him as fully corroborating all his former statements upon the increase of strength in iron bars through the effect of cold.

Mr. Spence has, however, in these experiments, laid himself open to even severer criticism than Mr. Joule was subjected to. In fact, though the experiments were very elaborately performed, there is not the slightest doubt in our minds that they are utterly valueless, as throwing any more light upon the point in dispute.

From a paper detailing the particulars of his experiments, read by Mr. Spence before the above-named society, at a later meeting than the one named in our former article, we derive the following account of them:

As I was not trying the absolute strength of any sort of

cast iron, I did not see the force of Mr. Brockbank's objection to my using one half inch bars instead of the orthodox one inch bars. I could obtain from one half inch bars equally good castings, and the machinery for breaking them was more manageable, and in my opinion more exact. A firm at Newton Heath made for me 50 bars, each three feet long by one half inch square, all out of one ladle, and of No. 3 Glengarnock pig and Kirkless Hall common pig—I name these although it does not seem of importance; all I wanted was good, sound, clean, and equal castings; and knowing the purpose for which they were intended, with great care they turned them out so well that not one of those sent to me was rejected. I now cut each of these bars in three lengths of one foot each, making nearly 150 pieces. They were now taken and all their ends covered with paint, in order that the new fracture might be examined as they were broken. The heap was then brought into the laboratory, having thus had three chances of perfect mixing. A boy of 11 years of age now handed me the pieces singly from the heap, and as I received them I placed them alternately one by one in two lots, until I had got 70 pieces in each lot. One of these was now taken and put into a cask capable of holding 2 cwt. to 3 cwt. of freezing mixture, composed of pounded ice and chloride of sodium (which instantly reduces the temperature to zero), and being surrounded with sawdust, they were kept there for nearly 48 hours. The other 70 were now put into the water at 70° Fah., and this was done chiefly in order that they might be broken wet, as they would necessarily be when taken out of the freezing mixture. The mode of breaking was this; I put a bar on the suspending wedges, then hooked on the weight scale, and with a number of weights much under the breaking load, raised the loose end of the plank by the screw jack, so as to bring the weights to bear. I now added single pounds or 2-pound weights till 15 pounds were put on; these were then taken off and a 14-pound weight was placed, and single pounds again put on, thus regularly adding till the bar snapped; I then recorded the breaking weight, my assistant meantime putting on another bar. I spent nearly eight hours in breaking these 70 bars, and every one got an equal amount of care. On opening up the freezing mixture 44 hours after enclosing it, I found it in perfect condition, little solution and no increase of temperature having taken place. The bars were taken into the laboratory in small lots, and immersed in another freezing mixture from which they were withdrawn singly with pliers. Having seized one piece with too firm a grasp, I found that my fingers grew white and produced an intense pain, as if burned. Some of the freezing mixture was spread on each bar with a spatula, while on the machine, so that every one was broken at a temperature within one or two degrees of zero. The mode of breaking was exactly similar to that employed with the other lot, and equal care was given to every bar. This I can affirm, as every one of them was broken by myself, and all entries made by myself. The results are before you, and to me it was a matter of surprise, when both sets were completed and added up, to find that they almost exactly corroborated my previous experiments, which I do not think were fallacious in their character, but merely defective in their not covering a sufficient amount of ground to give certainty to the result. I have, however, so much confidence in those now detailed, that I have no hesitation in giving it as an ascertained law, that a specimen of cast iron, having at 70° Fah. a given power of resistance to transverse strain, will, on its temperature being reduced to zero, have that power increased by 3 per cent.

A tabulated statement accompanied the paper, which shows the percentage of gain, in strength of iron at zero, over that of iron at 70°, claimed by Mr. Spence.

These results were, upon the reading of the paper, immediately excepted to by Mr. Carrick, on the ground that the breaking weights, given in Mr. Spence's table, showed such an excessive range in quantity, as to clearly indicate a want of homogeneity in the iron, which rendered any deduction from the experiments invalid. This range, in some cases, exceeded twenty-five per cent of the greatest breaking weights of one of the bars.

To Mr. Carrick's criticism, *Engineering* adds another of equal force, namely, that Mr. Spence appears not to have taken any care to insure that the bars tested were exactly ½ inch square. The force of this objection will be realized by all practical founders and machinists, who know what variations in size might be justly expected in bars made in the manner described.

It is evident that there is a present determination to settle this question finally; and the sharp criticism, which the experiments hitherto performed have met, indicates that nothing short of scientific certainty will be accepted. Any experimenter who does not cover all ground of objection need expect no tolerance for any opinions or conclusions he may arrive at.

THE ACCUMULATION OF WEALTH.

The present construction of society fixes no limit to the amount of property which individuals may amass, and as it also makes wealth the prime instrument in the attainment of luxurious living, and one of the most important rungs in the ladder by which men climb to political and social power, it is, to the majority of people, the most desirable of all earthly things.

In the United States all citizens stand on a common level of political equality so far as possiblities external to themselves are concerned. Ambition is stimulated and money sought with an avidity perhaps unequaled in any other part of the civilized world. We are a nation of money-getters, and every youth before he leaves his primary school books has had his dreams of future wealth and his aspirations for superior station and power. On reaching the age of majority, or in many cases even before, he has plunged into the mad race for wealth; and to make money fast, too often seems more important than to make it surely and honestly. His blood is fired with the fever of speculation. He takes large risks, and hesitates not at losses others may sustain, in case his schemes fail. He cannot complacently look upon a sure and safe method of doing business that would not only support him in comfort through life, but at the age of fifty or sixty years provide him with an independence upon which he might live through the remainder of his life in peaceful retirement. His mind pictures to itself the delights that wealth would purchase for a man of forty in the full flush of physical power. The splendid mansions, the fast horses, too often the fast women, the champagne suppers, the display which can be made by those mushrooms of fortune, who dazzle by their splendid equipages, fascinate him, and he gradually begins to feel that it matters little how he gets money provided he gets it quickly.

By and by you shall see him on 'Change, speculating in fancy stocks, or as the president of some stock company, the object of which is purely and simply to feather the nests of its promoters. If he go up at all, it will be like a rocket; if he come down, it will be like a stick.

It may happen, however, that he will prove to have the brain to stay up; if so, he will grasp and control enormous railroad interests, and perhaps become the king of the *Bourse*. But what sort of man is he then? Is he in any sense a man who has reached the proper end and purpose of living? Has he, in his splendid mansions, his sumptuous feasts, his rich apparel, and dazzling equipages, reached the fountain of true happiness and attained that which, when age shall paralyze, and disease rack with pain, will comfort, and solace, and sustain? When his powers shall fail him in the race, and active life must be relinquished, will his wealth appease the hunger of a mind unstored, give rest to weary limbs, or solace a soul from which sentiment has been banished, and in which there is little to win and keep that affection which is in old age so essential to happiness?

But were the evil effects of money greed confined to the accumulators of colossal fortunes, we might well leave them to themselves. The fact is, however, that enormous concentration of wealth in the hands of a few, is only another name for absorption of the substance which would otherwise be distributed among the masses.

We are not of those who believe that rates of interest or the like can be controlled by special enactment. Our usury laws are and always have been a farce, but surely all political economists will agree, that when any social system permits those who neither produce anything nor aid in the production of anything, and are mere drones and burdens upon society, to amass fortunes impossible to the industrious and frugal, a premium is offered against industry and good morals. What change can be made that will offer to honest industry and trade a better chance of pecuniary reward than is given to speculation, stock jobbing, and political manipulation, such as by which individuals known as "The Ring" have enriched themselves in this city, is a problem it is high time to grapple with.

TUBING THE EAST RIVER.

We have always maintained that tunnelling the East River was the true way to establish cheap, rapid, and safe transit between the cities of New York and Brooklyn. Such transit is all that is wanted to virtually consolidate the two cities into one. Tunnels will be cheaper than bridges of any kind possible to erect in such a manner as not to impede navigation. They can be constructed more rapidly, and can be placed at such points as will best accommodate the traveling public. Many avenues of communication rather than one trunk line will, we maintain, best subserve the interests of the public.

We are glad to see something, at last, which looks like work in this direction. General Slocum has introduced a bill in Congress which, if passed, will incorporate the Brooklyn and New York Submerged Tubular Bridge Company, the corporators named being Jacob Voorhees, John S. Harris, Henry M. Williams, Silas Herring, O. B. Latham, Francillo G. Daniels, Alexander McCree, Charles B. Smith, John Johnson, Adon Smith, John Evers, Jas. B. Floyd, and William C. Kingsley.

The tube or tunnel is designed to be large enough to accommodate a carriage way, footpaths, and a railway with one or more tracks. The tolls named are not to exceed one cent per foot passenger, three cents per head for cattle and horses, two cents per head for sheep, five cents for each saddle horse and rider, six cents for each single wagon and horse, twelve cents for each double wagon and horses, eighteen cents for each cart, and twenty-four cents for each loaded double wagon with two or more horses attached. The capital stock is not to be less than $3,000,000.

As many of our readers will recollect, a bill was passed by the New York State Legislature, some three years ago, incorporating a company for this purpose; but it has been thought (whether justly or not, we will not pretend to say) that the company obtained the franchise in the hope of selling out to a working company, rather than with the view of proceeding with the work on its own account. Be this as it may, nothing practical has resulted from its organization. The men named in General Slocum's bill are such as give hope that this company intend to really construct the subway for which they solicit a franchise.

There is nothing impracticable in the scheme. The tube may be laid either in sections or with flexible joints, after the manner described in articles which have appeared from time to time in this journal. It may be kept clean, dry, and airy, and if once laid will, in our opinion, demonstrate the value of this means of communication for New York and Brooklyn.

The great suspension bridge now building will probably not be completed within ten years from the date of its commencement. Such a tunnel as is proposed might be constructed and opened for traffic in twelve months.

To cure scratches on horses, wash the legs with warm, strong soap suds, and then with beef brine. It is said that two applications will cure the worst case.

SCIENTIFIC INTELLIGENCE.

DEATH OF BECQUEREL.

Paris papers announce the death of Antoine Cesar Becquerel, the celebrated electrician. He died in Normandy, while the siege of Paris was progressing, and very likely the sad event was hastened by the fatigue of his hasty flight from the capital. As nearly all of the members of the French Academy of Sciences remained at their posts to assist the Committee of Defence, the departure of the Becquerels, father and son, was much criticised; but the advanced age of the senior afforded a good excuse for the step he decided to take.

Becquerel was born March 8, 1788, and at the time of his death was, therefore, in his 84th year. He was three years older than Faraday, and during his long life, had been a contributor to the same department of knowledge as the great English philosopher, whose death we had occasion to announce in 1867. Between the years 1834 and 1840, he published his great treatise on electricity and magnetism, in seven large octavo volumes. This was followed by "Physics in its Relations to Chemistry," in two volumes; and the number of his contributions to the proceedings of the Academy, and to the journals of science, has been very great. He was one of the most prolific of French writers, and retained a remarkable vigor of intellect to the last. His son, Alexander Edmond Becquerel, born in Paris in 1820, is a worthy representative of the father, and is the author of many investigations on electricity and magnetism. The similarity of the name has lead to much confusion, and much of the younger Becquerel's work has been credited to the father. Another son, Alfred, is an eminent physician, and the author of valuable papers in his department of science.

COMPARISON OF THE CARRÉ AND WINDHAUSEN ICE MACHINES.

In the spring of last year, Dr. R. Schmidt, of Berlin, was requested to make a comparative examination of two of the most prominent inventions for the artificial production of ice. He selected the systems of Carré and Windhausen, both of which have been fully described in this journal. Experiments were made during half a year, or 150 days—the day estimated at twelve hours—and for each horse power 96 pounds of coal were taken. There were also consumed 110 pounds of sal-ammoniac and 110 pounds of chloride of calcium. The results were as follows: A Carré machine, producing hourly 400 pounds of ice, cost in Berlin $5,200; and the daily expense of producing 400 pounds of ice is set down at 1¼ cents a pound. The Windhausen machine costs $5,800, the running expenses are one third more, and the cost of the ice is nearly 2 cents a pound. Preference is therefore given to the Carré machine, in which the condensation of ammonia is employed as the refrigerating agent. Similar results have been obtained in this country, and in New Orleans it is thought that all the ice required for the consumption of the city will hereafter be made by the ammonia method.

SALT WELLS IN PRUSSIA.

The great success of the Stassfurt mines in Germany has been the occasion of numerous borings in various parts of the country, not unlike the search for petroleum wells in the United States. About thirty miles south of Berlin, a salt deposit was reached at a depth of 280 feet; and, at last accounts, although a depth of 3,242 feet had been attained, the bottom of the bed had not been found; this shows a layer of salt over 2,962 feet in thickness. Similar borings ought to be made in this country, as the indications in several localities point out deposits of nearly equal dimensions. The cost of salt in the United States is unpardonably great, and a little more wholesome competition would be better for all concerned.

CULTIVATION OF THE CINCHONA TREE.

The cultivation of the cinchona tree, from which quinine is obtained, has been successfully prosecuted on the island of Jamaica since 1860. Some of the plants have been raised from the seed, and notwithstanding the drought, they are growing in the most satisfactory manner, and more than 20,000 good sprouts have been obtained. As all attempts to make quinine artificially have failed, the next best thing is to raise plantations of the tree, and to observe some precautions in stripping the bark. The scarcity of bark has induced a great increase in the demand for the invaluable fever remedy, and the culture is one that, from every point of view, must commend itself to the attention of agriculturists who live in the zone where the cinchona tree will flourish.

A NEW USE FOR BAMBOO.

Since the Board of Education has positively forbidden the *a posteriori* application of bamboo as an aid to mental discipline, and since the agitation of the St. Domingo question, much attention has been paid to one production of the now famous island; and we hear that the fiber of the bamboo is likely to be extensively used as a substitute for shoddy in the manufacture of clothes. We have been shown some of the fiber dyed and woven into the texture of cloth, which only an expert could distinguish from wool. As a material for the manufacture of paper, the bamboo is also strongly recommended, and as it is a waste product in San Domingo, some good may finally result from the vexed question of annexation.

THE MEDICINE OF A PATENT.—One of our clients, to whom we recently sent the good news of the allowance of his patent, writes back to us as follows: "I must confess this has been a perfect surprise to me, and I am somewhat inclined to think that the good news of my success in obtaining this patent, through your kind efforts, has *hastened my recovery* from a severe spell of sickness."

THE PRESENT AND THE PAST.

NUMBER VIII.—RECONSTRUCTION—(*Continued.*)

We have now the materials for reconstruction dispersed over the sea bed. Omitting the deposits forming in mid-ocean, we see that those materials are laid down in a zone of greater or less width around the coasts; and within that zone, are so dispersed that the coarsest portions are nearest the land, and the finest at the extreme limit of the carrying power of the off-shore currents. And if we, moreover, take note of the animal life that is associated with these deposits, we shall find that it likewise is distributed according to fixed rules. Every fisherman knows this fact by practical experience, and recalls it when in search of some favorite bait, or casting for any particular fish or shellfish. The rocky coasts swarm with numerous characteristic species, the mud flats abound in others, while numbers confine their lives to the sandy shoals. Certain species live semi-amphibiously, between tide-marks, others never venture into that region, unless driven in by fear or stress of weather; many beautiful forms, and some that are equally hideous to our eyes, are altogether pelagic in their habits, thriving only in the waters removed from land,

The joyous playmates of the buxom breeze,
The fearless fondlings of the mighty seas,

or dwelling in darkness in the very abysses of the ocean. Coral reefs, too, are singularly rich in peculiar and often gaily colored kinds, not merely of the minute creatures which erect these vast monuments that mark where continents lie buried, but of almost every great group of marine animals. Show a collection of animals, from any region of the sea, to an expert zöologist, and he will tell you the character of the sediment, and the zone of depth from which they were obtained.

If these deposits, and the relics they contain, of the animals that lived among them, are preserved by being converted into rocks and eventually exposed above the level of the sea, it is evident that in such rocks, formed heretofore, we have an important portion of the history of the region in which they were laid down; and we know that the greater part of the crust of the earth, accessible to our investigations, is composed of successions of such deposits of ancient seas. Thus, in geological formations, or in groups of rocks classified together because of the more or less close relationship of the creatures that lived during the period of their accumulation, we have successive stages in the history of the physical geography of the earth.

In order to learn the way to read this history aright, let look at one or two examples of geological formations.

First, let us take a group from the palæozoic series of formations, and we find the deposits of the Niagara period, represented by the following series of rocks in descending order: The Niagara limestone, the Clinton shales, the Medina sandstone, the Oneida conglomerate; and these names indicate, in a general manner, the lithological character of the successive strata, as found over a very extensive area. We have here pebbles, sand, clay, and limestone deposits preserved; but, observe, not arranged side by side as on the bed of one sea, but superposed vertically as successive accumulations. Again, let us take another example: In the great cretaceous formation that forms so large a portion of the structure of the western part of the Old World, we have above, at the top of the series, the chalk, then the chalk-marl (an earthy chalk), resting upon the greensand, which is, in its general character, as its name imports, a sand. Here, again, we have calcareous, argillaceous, and arenaceous deposits, arranged in superposed strata; and if we trace these out over a very wide area, we shall find them always retaining this order. The greensand will always be below the chalk.

In this vertical arrangement of deposits, lies a difficulty that has greatly bewildered geologists. It is quite impossible that sand should be laid down by the same current, at the same time, far as well as wide; just as impossible as it would be for a cannon ball to strike an object with equal force at the distance of five miles as at the distance of one, and for a similar reason. And yet we have, in the instances given above, sands laid down over areas extending perhaps hundreds of miles, both north and south, and east and west. It is therefore clear, that neither all parts of the greensand, in the one case, nor of the Medina sandstone in the other, can be, throughout their horizontal extension, of the same age. Their accumulation must have been gradual over the surface as well as in depth. The same may be concluded of the argillaceous beds in the two sections, and of the conglomerate in the first. Again, while the sand in these cases was being deposited, when were the accompanying finer materials laid down? Is it possible that these vertically arranged, and, therefore, apparently successive strata, represent deposits in reality formed side by side on the bed of one sea? The idea thus expressed seems paradoxical. Let us, however, consider what would be the effect, upon deposits, of a gradual alteration of the level of sea and land accompanying their deposition. Imagine our eastern coast gradually subsiding beneath the waters of the Atlantic! Pebbles are lying where the forests once grew; the depression continues, and the waters gradually creep further over the land; sand is laid down over the pebbles, and, as the movement continues, and the shore recedes from the spot we are watching, finer argillaceous sediment covers up the sand, until, finally, if the subsidence continue to a sufficient extent, the deep sea Atlantic ooze will overgrow all, and we shall thus eventually have formed a vertical series of chalky limestone, clay, sand, and pebbles, in descending order. We thus arrive at the very important conclusion that a series of deposits, forming at one time, will, by a gradual shifting of conditions brought about by an alteration of level, be converted into a series of strata; and, conversely, that an unbroken series of strata at one point must represent a series of deposits that were once forming simultaneously over a wider area. According to this view, the greensand is the along-shore deposit, and the chalk, the deep-sea ooze of one and the same cretaceous sea; and, so far from the overlying chalk, as a whole, being of later date than the underlying greensand, they must both have been, from the first, in process of formation together; and, in fact, the chalk deposits of one locality may be absolutely of earlier date than the greensand of another. Nay, the recent explorations of the bed of the Atlantic ocean, revealing, as still in existence in its depths, conditions quite cretaceous in their characters, suggest that a formation may continue in one sea, not merely long after it has ceased elsewhere, but even geologic ages after some portions of it have been upheaved into dry land, and converted into extensive continental surfaces and high mountain ranges.

Prussian Staff Organization.

Prussia settles the dispute as to which is the more important, the study of theory or devotion to practice, by uniting the two in harmonious proportions, giving the practical education, however, the first place in the order of succession. All candidates for commissions, excepting the cadets, are required to go through a course of practical service before obtaining theoretical instruction. And all Prussian military authorities agree in considering this preferable to the opposite system adopted in France and England, as well as the United States, of giving the theoretical instruction before the practical. It is maintained in Prussia that theory can be more readily understood if based on a groundwork of actual practical knowledge, and that officers of the age of twenty-three or twenty-four, with a practical knowledge of their duties, derive more advantage from study than youths of seventeen or eighteen, who have no previous acquaintance with the subject of their studies.

Some one hundred and twenty young officers present themselves yearly for admission into the war academy at Berlin, to go through the curriculum of studies necessary for admittance into the staff. About a third are accepted, the other two thirds are returned to their regiments, the entry being secured by competitive examination of the candidates.

The professors of the academy yearly designate to General Moltke, the head of the staff, those officers who, having completed their course, have proved themselves most studious and efficient. Out of these, the General selects a certain number, according to the probable wants of the service and vacancies during the coming year, taking care to choose some from each branch of the service. The selected ones are recalled from their regiments, and sent to serve for nine months in a branch of the service other than their own. The most zealous are appointed to the staff at Berlin, and spend a year and a half under the immediate supervision of General Moltke himself, who by this means makes himself thoroughly acquainted with the character and special turn of mind of the best officers of the staff. The General himself gives lectures. The young staff officers write treatises on certain given subjects, and General Moltke reads or criticises them before all the rest, without, however, making known the name of the author.

Again are these officers sent back to their regiments, and in the course of the next six months, those whom General Moltke has finally selected are gazetted as captains of the staff, and at last are entitled to wear the uniform.

Once gazetted, General Moltke selects the best out of the good, to join the "great staff" at Berlin. The others are appointed to the staff of army corps and divisions. General Moltke rigidly excludes from the staff any officer who is physically incapable of being a first rate horseman, no matter how excellent may be his aptitude in every other respect.

We doubt whether such thoroughness as this is possible to any but the patient German race; but what would not such a staff have done for us in our war of the rebellion, when a lot of boys fresh from civil life, and ignorant of the first principles of military science, were our chief dependence for the difficult and delicate duties of staff officers? It is marvellous that they did as well as they did, with no other preparation than the few weeks' study of the regulations, tactics, and such works on the art of war as came most readily to hand.—*Army and Navy Journal.*

An Electric Joke.

Some weeks ago, one of those illegitimate sons of science, the vagrant electric men, opened out at Fourth and Market streets, with his dial for testing how much torture his voluntary victims could stand. To stimulate trade, he kept a standing offer to pay $5 to whomever could stand as much electric fluid as his machine would furnish. One day, a boy presented himself and announced that he had come to win that $5. The man handed him the "handles," and started the machine. The boy stood it wonderfully. The operator turned the crank faster, and asked the boy how it felt. The boy said it did not feel at all. The man thought something must be the matter, and commenced an elaborate tightening up of the screws, and then commenced another series of swift revolutions, which ought to have produced a current sufficient to kill the boy; still he laughingly assured the fellow that he did not experience the slightest sensation. Out of patience, the man demanded to see his hands, and then the secret was explained. The boy belonged to the telegraph office, and had picked up one of the pieces of insulated wire now being put up inside the office, and had passed it up one sleeve of his coat, around his shoulders, and down the other sleeve, and then uncovered the ends of the wires in each hand. Thus armed, he had gone to the electric man; of course, the uncovered ends of the wire, pressed against the metallic handles, presented a better medium than the boy's body, and the current simply passed to them and along the insulated wire around the boy's body, without touching him. That "electrician" was very mad, and all the more so as the crowd drawn together thought it a good joke, and took the boy's part. The man was so laughed at that he left town.

Enameling Photographs.

The beautiful gloss called enameling is produced as follows: "After the prints have been toned and washed in the usual way, trim to the right size by means of a cutting shape; then immerse in a warm solution of gelatin (which must be kept, whilst operating, nearly as possible of an equal temperature) of about the same consistency as collodion. Care should be taken always to filter the solution before using. When thoroughly impregnated with the same, the prints are taken out and laid, face down, on collodionized glass plates (preparation of which is given below), care being taken that all air bubbles between the paper and glass are carefully pressed out and removed. Afterwards, a sheet of stout white paper, somewhat larger than the prints, is cemented to the back of each photograph—a precaution for protecting the pictures in the event of their spontaneously leaving the glass on drying. The plates are allowed to remain for ten or twelve hours (say over night) in a dry locality, and, at the end of that time, the portraits may be separated from the glass by making an incision of the film all round the paper. The superfluous paper should be trimmed off previously to the pictures being mounted upon the cards.

Many of the manipulations may be slightly modified if desired; for instance, instead of cementing a piece of paper to the back of the prints, the card itself, if not very thick, may be at once attached, the margin of which will be gelatinized in the same way as the picture. Some photographers add a small quantity of sugar candy to the gelatin in order to prevent the sizing solution drying too rapidly, and to render the finished card more plastic and impressionable to the cameo embossing press, which apparatus gives to these pictures a most beautiful and pleasing effect.

TO PREPARE THE COLLODIONIZED PLATE.—Glass plates of a suitable size, say, 8½ by 6½ or 10 by 8, and which have been carefully cleaned, as if to serve for taking negatives upon, are rubbed over with finely powdered pumice stone or Tripoli powder, which is afterwards thoroughly removed by means of a soft dusting brush. The plates are then coated with a four per cent normal solution of collodion, and placed to dry in a spot free from dust; they are then ready for use."

Effects of the Bombardment of Paris.

The correspondent of the London *Times* gives the following account of the effects of the bombardment on the Jardin des Plantes: No fewer than eighty-three shells had fallen within this comparatively limited area. On the nights of January 8th and 9th, four shells fell into the glass houses and shattered the greater part of them to atoms. A heap of glass fragments lying hard by testified to the destruction, but the effect of the shells was actually to pulverize the glass, so that it fell almost like dust over the gardens. The consequence was that nearly the whole of this most rare and valuable collection was exposed to one of the coldest nights of the year, and whole families of plants were killed by the frost. Some of the plants suffered the most singular effects from the concussion; the fibers were stripped bare, and the bark peeled off in many instances. All the Orchids, all the Clusiaceæ, the Cyclantheæ, the Pandaneæ, were completely destroyed, either by the shells themselves, or by the effects of the cold. The large palm house was destroyed, and the tender tropical contents were exposed to that bitterly cold night; yet, singularly enough, although they have suffered severely, not one has yet died.

All through the whole of the fortnight during which these gardens were subjected to this rain of shells, MM. Decaisne, Chevreuil, and Milne-Edwards remained at their posts, unable to rest; and have since, at their own expense, repaired the damage done, trusting that whatever form of government France may choose, it will not repudiate its debts of honor. M. Decaisne is making out a list of his losses, a large proportion of which might possibly be supplied from Kew, while owners of private collections might also be glad to testify their sympathy and interest in the cause of science, by contributing whatever they may be able to spare, as soon as the amount and nature of the loss is ascertained.

The animals fared better than the plants. Not only have none of them been eaten by the population of Paris, as the latter fondly suppose, but, although several shells burst among them, they have escaped uninjured. Of course, when food was so scarce for human beings, the monkeys and their companions were put upon short allowance. This fact, coupled with the extreme rigor of the season, increased the rate of mortality among them, and one elephant died, but was not eaten. The two elephants and the camel that were eaten belonged to the Jardin d'Acclimatation, and had been removed in the early stage of the siege from their ordinary home in the Bois de Boulogne, for safety, to the Jardin des Plantes, where, however, it would appear, it was not to be found. The birds screamed, and the animals cowered, as the shells came rushing overhead and bursting near them, as they do when some terrific storm frightens them; latterly, they seemed to become used to it.

OF the many chewers of tobacco in these days, there must be many who wish to relinquish the habit. We are informed that a little coarsely cut gentian root, well masticated (the saliva being swallowed), taken after every meal, will soon take away all desire for the chewing of tobacco.

Dentition of Babies, Lambs, and Colts.

The pain and difficulties of dentition in the infancy of human beings are well known, and the troublesome paroxysms of pain and fits, to which infants are subject, are usually relieved by lancing the gums, by giving the child a hard substance to bite, or otherwise removing the membrane which covers the nascent tooth, and which the tooth pulls at and stretches, till the little patient can bear it no longer. Lambs and colts suffer from exactly the same cause, in the same manner; and many valuable animals may be saved to the stock breeder by employing the lancet to remove the integument. "S. B.," in the *Medical Investigator*, states that he has often employed the lancet on babies as well as on cattle, and argues that the sweeping denunciation of its use, by doctors of a certain school, is erroneous, and that medicine alone will not remove all the troubles of retarded and imperfect dentition.

NEW TEXTILE FIBER.—The pestiferous weed called Indian mallow is too well known to Western farmers as an almost ineradicable and irrepressible enemy. But everything in nature has its use; and we hear that the fibers of the obnoxious plant are strong, fine, easily bleached, and can be separated from the woody substance of the stalk without hackling. The *Springfield Register* states that the fibers are from seven to ten, sometimes twelve, feet in length, and that the plant will yield a ton of them to the acre. Those who have tried to exterminate it well know that it will grow anywhere; and its powers of flourishing under difficulties will soon force themselves into notice.

The Philadelphia "Scientific Journal"

Says that "Messrs. Geo. P. Rowell & Co., of New York, are so well and extensively known, all over this continent, that to name them and explain the nature of their business would be superfluous. No Newspaper Advertising Agency has ever displayed more energy and skill in the transaction of this delicate and tact-requiring business."

A Most Excellent Wringing Machine.

Some people are now buying Clothes Wringers which have cog wheels on one or both ends of the shaft; yet these cog wheels play entirely apart when wringing larger clothes, and are then no better than the cheap machines without any cog wheels. We can recommend to our readers the "Universal," as it has cog wheels with very long teeth, which are prevented from throwing entirely apart by a "patent stop," which is an important improvement for the durability of the machine.—*Mass. Ploughman.*

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

All reference to back numbers must be by volume and page.

MOLDS FOR MEDALS.—Let J. E. W. take a thin piece of wood, of the thickness of the cast around the edge. Then cut a hole and fit in the medal perfectly. Dampen some soft newspaper, and spread over the face. Beat to a pulp about one eighth inch thick all over one face of the medal, and about one half inch around on the wood. Now spread some more over without beating, and clamp fast to the wood. Dry by the fire perfectly. That will remove when dry. Then operate with the other side in the same manner. He will then have molds more perfect than can be made in any other way I know of, except they are made of metal. Let him take out the medal, and place the papers in position, making a vent through the wood for air and gases. He need not be afraid of the paper's burning.—B. D. S., of Omaha.

TEMPERING COLD CHISELS MADE FROM OLD FILES.—Let your querist be sure to grind out all marks of the teeth before forging; forge at a dull red heat. Heat them a little hotter to harden, and draw them nearly or quite down to blue. Harden them in pure water, if possible; if not, add salt to the water; if that will not do, add sulphuric acid to the salt and water; if that will not do, harden them in pure sulphuric acid. Steel that will not harden in cold water will be hardly worth time in working into cutting tools.—S. G. S., of Conn.

SPRINGS OF IRON WIRE.—I make a good spiral spring, of iron wire, in the manner following: After winding the wire around the mandrel, I take the latter out and replace it with a rod of common rough iron, large enough to quite fill the spring, as after the spring has been cut off, it will unwind enough to increase the diameter considerably. Then I take the rod with the spring on it, and heat to a cherry red, after which I sprinkle it with prussiate of potash. I repeat this two or three times. After putting on the salt for the last time, I heat again and plunge into cold water, and I have a spring as brittle as glass. Then I put oil on it, retaining the spring on the rod, and I heat till the oil burns off with a blaze.—A. G. B., of Mass.

H. R. K., of Pa.—You may make cotton cloth both air and water tight by the following process: Make a dough by dissolving india-rubber in coal naptha, in the proportion of 1½ pounds naptha to 1 pound of best rubber. Spread this dough on your calico as thin and as evenly as possible; put on five coats; double the cloth together, having the rubber inside, and you will find it will be thoroughly air proof and water proof.

C. C. L., of Ind.—A mandrel is not necessarily a straight cylinder; it may have a taper, and still be properly called a mandrel. In feeding water to your boiler, there will be no gain in heating it, unless you heat by gases from the uptake, by exhaust steam, or from some source in which the heat would be otherwise wasted. In heating by either of these means, the gain in raising the water 125° Fah. from 32° Fah. would be a little more than ten per cent.

S. S., of Va.—From your description of the cement purporting to be hydraulic cement, the manner of using it, and its crumbling after it was used, we think the cement is not a good article; we cannot see any fault in the method of applying it. We judge the cement is deficient in alumina.

D. C. B.—If not a practical chemist, you will not be likely to make a very succesful analysis of iron ore. We cannot give you, in such space as we can spare here, such directions as would enable you to make such an analysis. If you wish a reliable result, you had better apply to some skilled chemist.

N. J., of Colo.—The patent of Charles Goodyear in soft rubber expired in 1865. His hard rubber patent, having been extended seven years from expiration of original grant, will not expire till May 5, 1872.

N. L. C., of ——.—The salts of nickel, used in electro plating, are soluble in water. See articles on pages 184 and 298, Vol. XXII., of the SCIENTIFIC AMERICAN.

W. Y., of Va.—The pressure on the fulcrum of any lever, exclusive of the weight of the lever itself, is the sum of the pressures exerted by the power and the weight or resistance to be overcome.

O. S. M., of Va.—Workmen in color factories can do much to prevent injury through absorptive poisoning if they will, and we think they pretty generally know it. We do not think they could wholly avoid injury. The same remarks apply to workmen in quicksilver mines, etc.

C. H. J., of N. Y.—Your communication contains information we have already recently published. Hope to hear from you again on other practical subjects.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—TEMPERING VOLUTE SPRINGS.—How can I best temper volute springs made of plate 5-16 of an inch thick, 6 inches wide, and 70 inches in length?—J. V. R.

2.—PREPARATION FOR MUSLIN.—I would like a recipe for preparing paper or muslin, so that it could not be printed on with ordinary printer's black ink. This preparation must not injure the paper or muslin. Changing the color of it is immaterial.

3.—GRAY OPAQUE VARNISH.—Is there any kind of gum that, [when melted, will incorporate with linseed oil and turpentine (or naphtha), to produce an opaque varnish, not darker than a granite gray, and which will not be transparent when applied, even upon glass? or is there any material that, mixed with varnish, will remain suspended (and not precipitate in time) that will produce the same effect? Chemical action upon the oil has been the trouble I have experienced with light materials suspension.—L. C. B.

4.—TEMPERING CARRIAGE SPRINGS. FLUX FOR WELDING CAST STEEL.—Please to inform me what ingredients I shall use, and what proportion of each, with oil for tempering carriage springs? And also, what kind of flux is best for welding cast steel?—S. B.

5.—PLATING IRON.—Does it require much skill and experience, or costly and expensive apparatus, to plate iron on a small scale? Is there any work treating specially this subject? Will some practical plater answer these queries, and give me directions for plating iron with silver, etc.?

6.—DYEING COTTON ANILINE BLACK.—I wish a practical method of dyeing cotton black with aniline.—S. E. M.

7.—BRONZING.—Will some of your numerous readers give me a good preparation for bronzing small malleable iron castings?—W. C. J.

8.—SMALL CASTINGS FOR MODELS.—What alloy that melts at a much lower temperature than brass would be suitable for castings designed for small models of machinery?—T. C. A.

9.—CEMENT FOR MARBLE.—What cement can I use to mend a broken marble statuette, without showing an unsightly white or colored seam?—C. H. P.

10.—CUTTING SMALL WHEELS.—Can the teeth of small wheels be cut, with any degree of accuracy, in a small engine lathe? Is there any simple attachment that can be applied to do this in a small way?—B. B. L.

11.—PAINT THE COLOR OF GOLD.—What paint can I use that will nearest resemble gold, and will match gilding?—J. K. P.

12.—IMITATION OF EBONY.—How can a good imitation of ebony be made, say with pear, apple tree, or other fine, close-grained hard wood?—E. E. B.

13.—LEAKY FAUCETS.—What is the best method of grinding faucets that leak, so as to make them tight again? I have tried oil and emery, but it does not work well; it cuts in streaks, and bites into the metal, so that it cuts unequally.—C. H. K.

NEW BOOKS AND PUBLICATIONS.

OVER THE OCEAN; or, Sights and Scenes in Foreign Lands. By Curtis Guild, Editor of the *Commercial Bulletin*. 1 vol., crown 8vo, pp. 559.

This volume embraces a series of letters written to the above journal, and extends over a seven months' tour through various parts of Europe. They are lively sketches, and generally very faithful to all the facts which arrest the attention of tourists.

THE April number of the *American Builder*, Chas. D. Lakey, Editor and Publisher, 151 and 153 Monroe street, Chicago, Ill., is in every way a credit to American technical journalism. Its illustrations are first class, its matter both entertaining and instructive, and its typography unexceptionable. It is by far the best publication devoted to architecture and art issued on the American continent, and we are not in the least surprised that it has secured a large and increasing circulation. There is no publication among our exchanges more heartily welcomed to our table, and our readers who have had a taste of its quality in some extracts selected from time to time for our paper, will need no proof of the practical, as well as theoretical value of its contents.

LEFFEL'S *Illustrated Mechanical Monthly* is the name of a new periodical published at Springfield, Ohio, by James Leffel & Co., manufacturers of the celebrated turbine water wheel which bears their name. It is a very creditable quarto of eight pages, devoted to science and the mechanical and industrial arts, and illustrated by engravings.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

BRAKE FOR WAGONS AND CARS.—R. A. Dement, Hudson, Ill.—This invention relates to a new self-locking brake, which is applicable to all kinds of wheeled vehicles, such as wagons, carriages, car trucks, etc., and consists in the combination of a series of pivoted shoes, with a sliding yoke and eccentric disk, and the brake stem, all operating so that by carrying the wrist pin in the eccentric ahead of or behind the axis of the stem, the shoes will be locked in their respective positions.

SPINDLE FOR WRINGER ROLLS.—T. E. McDonald, Trenton, N. J.—The present invention relates to a new and improved spindle for wringer rollers, the nature of which consists in dovetailing the spindle longitudinally so that the rubber, when rolled over the same, may be pressed into the said dovetailed grooves, and thereby serve to lock and hold the rubber roller to its spindle.

MACHINE FOR MANUFACTURING COMPOSITION ROOFING.—J. J. Wiggin, New York city.—This invention relates to a new apparatus for applying roofing compounds to paper, felt, canvas, or other fabric, and consists in the use of a movable vehicle carrying a distributing trough and suitable rollers, for feeding and laying the paper to and upon the compound that has rom the trough been discharged upon a bed of sand, gravel, or other material.

SHAWL STRAP.—G. B. Broad, Waterville, Maine.—This invention has for i object to furnish a neat, simple, and convenient device for confining a shawl or other bundle for carriage.

FRICTION CLUTCH FOR MOWING MACHINES.—G. S. Reynolds, Lebanon, N. H.—This invention relates to a new friction clutch, to be used on mowing and reaping machines, in place of the ordinary pawl and ratchet connection between the driving wheel and the driving axle. The invention consists in the employment of a slotted pawl, which has a grooved face that fits a projecting rim on the wheel to which it is to impart motion.

SOFA BED.—C. C. Schmitt, New York city.—This invention relates to a new sofa bed, which is so arranged that the sofa lining will not be occupied for supporting the bed, and that the length of sofa will constitute the breadth of the bed.

MACHINE FOR PRINTING OIL-CLOTH AND OTHER FABRIC.—Charles Rommel, Elizabeth, N. J.—This invention relates to a new machine for grinding oil-cloths, wax cloths, and other fabrics, and has for its object to permit the successive printing, by one cylinder, of the several colors which are to be applied to the same fabric.

SKATE.—W. H. Barker, Windsor, Nova Scotia, Canada.—This invention relates to new and useful improvements in skates whereby they are more securely fastened and more readily adjusted to the foot than skates of ordinary construction.

SHOW CASE.—G. A. Hearn, Jr., New York city.—This invention relates to a new and useful improvement in show cases for merchants' use, more especially designed for the dry goods trade, and for the more costly varieties of goods, as kid gloves, laces, silks, etc.

BIT BRACE.—J. T. Lynam, Jeffersonville, Ind.—The object of this invention is to provide a bit brace with a mechanism whereby it can be used like a ratchet drill, that is to say, oscillated in either direction, in order to impart intermittent rotary motion to the bit.

WINE PRESS.—A. H. Wyker, South Easton, Pa.—This invention has for its object to furnish an improved press for pressing wine, lard, sausages, etc., which shall be strong, durable, effective, and not liable to get out of order.

WEATHER-BOARD GAGE.—Matthew Newlove, Burlington, Iowa.—This invention has for its object to furnish an improved instrument for gaging weather siding, or clapboards, as they are applied to the building, so that all the boards may have the same width of surface exposed to the weather; which shall support the board securely in place while being scribed and nailed, and which shall at the same time be simple in construction and convenient and effective in use.

COMBINED COTTON SEED PLANTER AND CULTIVATOR.—J. A. Wright, Marietta, Ga.—This invention has for its object to furnish an improved machine, which shall be simple in construction and effective in operation, being so constructed that it may be used for planting the crop, and afterwards cultivating it, doing its work easily and well in either capacity.

ANTI-ROCKING ATTACHMENT FOR RAILROAD CARS.—J. B. Crabill, La Crosse, Ill.—This invention has for its object to furnish an improved device for attachment to the adjacent ends of railroad cars, to diminish or stop the vibration or rocking of the cars independent of each, so that the rocking or vibration of each car may be resisted and counteracted by the inertia or weight of all the other cars of the train.

BARN-DOOR HANGINGS.—George Rumsey, Watkins, N. Y.—This invention relates to a hanging for suspending sliding doors to the walls of barns or other outbuildings, said hanging being used in combination with a track having a flange or web projecting to each side, and being also made up in part of a hanger, having an offset that gives room for the said flanges, as the hanger travels past them during the sliding of the door.

SLEEVE AND CHEMISE BUTTON.—G. A. Schultz, Louisville, Ky.—This invention consists in a peculiar arrangement of a rigid and a loose revolving spring arm, with a disk or plate provided with notched lugs, in which the spring arm engages, thereby securing the button to the clothing.

DENTIST'S INSTRUMENT STAND.—John J. Ross, Hernando, Miss.—This invention has for its object to facilitate the work and save the time of dentists, and it relates to a stand having a rotary top set on an upright, said top being divided, on its upper side, into separate compartments for the reception of the different sorts of dental instruments.

PERFUMING AND DISINFECTING APPARATUS.—Otto Boldemann, New York city.—This invention relates to improvements in evaporating perfuming, disinfecting, or other fluids, and it consists in subjecting them to the action of a metallic platinum burner, suspended in or above a vessel containing a quantity of alcohol, or other liquid containing hydrogen, with which the perfuming, disinfecting or other liquid to be evaporated is mixed.

BALANCED SLIDE VALVES.—A. G. Barrett, Barrett, Kansas.—This invention relates to improvements in balanced slide valves, and consists in an arrangement of the valve and steam passages, by which the steam is caused to act upon the valve alike above and below, except a slight preponderance of pressure above, due to the absence of upward pressure at the exhaust ports, so that the valve will be balanced, or nearly so.

STALLS FOR HORSES.—D. M. Dennison, Savannah, Ga.—This invention relates to improvements in stalls for horses, and it consists in two or more stalls, having sides of boards, slats and posts connected to an end part at the head, in which racks and a feeding trough are placed, the sides being arranged oblique to each other, and each alternate stall reversed so that the sides between stalls are connected at each end to one head part, and thereby constitute self-sustaining stalls, which may be placed on the ground or floor, without other support, and the sides and ends are to be detachably connected together, so that they may be readily set up or taken down.

WINDOW REGULATOR.—John F. Dingee, Bedford Station, N. Y.—This invention relates to a new and improved method of holding and regulating the sashes of windows, and it consists in the application and adjustment of a roller, whereby the sash is held from falling, or is locked.

FISH NET SUPPORTER.—Benjamin Ryder, Jr., South Orrington, Me.—This invention relates to a new and useful improvement in the method of taking fish in tidal waters, and consists in attaching the net to a frame anchored to the bottom of the river or water, in such a manner that its position and that of the net will be governed by the flow of the tide.

BENCH VISE.—William F. Harwood, Cambridge, N. Y.—This invention has for its object to improve the construction of bench vises, especially the bench vise patented by Mason Prentiss, March 17, 1868, so as to enable the vises to hold tapering articles vertically, and it consists in the self-adjusting piece imbedded in the face of the jaw of the vise.

WATER WHEELS.—John H. Staples, Wells, Me.—This invention relates to a new manner of constructing the buckets and top plates of water wheels, for the purpose of preventing loss of power by an unprofitable presentation of surface to the moving water, and consists in making the inner surfaces of the buckets slope concavously toward and against the core of the wheel, and in the same manner providing a gradual descent toward the said core or center of the projecting top plate of the wheel. The outer face of each bucket, and the top surface of the wheel, remain straight, as heretofore.

SLEEPING CARS.—Benjamin F. Marrier, Green Island, N. Y.—This invention relates to improvements in sleeping cars, and it consists in suspending the outer edges of the frames of the upper berths, which are pivoted at the inner edges to the side of the car, by machine chains, wire ropes, or the like devices, which will not stretch to any material extent, and counterbalance weights, so arranged that the weights, coming against suitable stops when the berth is turned down, will hold it in the position in which it is required to be for use, without the intervention of any other supports, the weights being so adjusted that when the berth is down in the horizontal position, its gravity, being thereby taken off the pivots to a considerable extent, will overbalance the weight and hold it down; but when turned up against the top of the car, as such berths are when not in use, and the gravity shifted on to the pivots to a greater extent, the weights will overbalance the berth, and hold it up securely without the aid of other fastening.

SELF-ACTING SHIPS' PUMPS.—D. A. Dunham, Pilatka, Fla.—This invention relates to improvements in the construction and arrangement of ships' pumps, actuated by a weighted pendulum, suspended so as to maintain a vertical line while the ship rolls, and swing the pump relatively to the pendulum, and it consists in a pendulum provided near the point of suspension, with rigid radial arms, preferably four in number, from the outer ends of which vertical rods, connected with pump pistons below, are suspended, the said pendulum being suspended on a portable frame of peculiar construction.

STEAM ENGINES.—Nathan E. Nash, Westerly, R. I.—This invention relates to improvements in steam engines, and it consists in an arrangement of four cylinders, radially, in a four or eight sided, or circular piece of metal, and a connection of the pistons, in pairs, with the wrist pin of the crank, by one yoke or slotted bar, to which the two coincident piston rods are connected; and it also consists of a novel arrangement on the crank shaft, and with the ports of a notched rotary plate, for opening and closing the ports.

PICKET CUTTER.—James W. Clark, Outville, Ohio.—This invention relates to a new and improved machine for cutting the pickets near the ends, for making the ornamental tops, and it consists in a broad thin cutter of steel, shaped in cross sections to correspond with the line to which it is required to shape the picket on each side, and a corresponding bed plate or cutter, the first mentioned cutter being mounted on a vertically reciprocating cross-head, arranged in suitable guides and provided with a hand lever for operating it, said hand lever being connected by a rod with a clamping lever on the bed plate, under which, at one end, the picket is placed, and clamped for holding it in place while the cutting is done, the said clamping being effected by the power applied to the lever for effecting the cutting.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING APRIL 11, 1871.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT FEES:

On each Caveat	$10
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On filing each application for a Patent, (seventeen years)	$15
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For Copy of Claim of any Patent issued within 30 years $1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from $1
upward, but usually at the price above-named.
The full Specification of any patent issued since Nov. 20, 1866 at which time the Patent Office commenced printing them .... $1·25
Official Copies of Drawings of any patent issued since 1896, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.
Full information, as to price of drawings, in each case, may be had by addressing

MUNN & CO.,
Patent Solicitors, 37 Park Row, New York.

113,478.—MANUFACTURE OF PEAT FUEL.—David Aikman, Montreal, Canada.
113,479.—TICKET HOLDER.—A. F. R. Arndt, Cleveland, Ohio.
113,480.—PITCHING BARRELS.—William Anheuser, St. Louis, Mo.
113,481.—FIRE CHAMBER FOR PUDDLING, STEAM BOILER, AND OTHER FURNACES.—W. F. Beecher, Pittsburgh, Pa.
113,482.—COMBINED PLOW AND SEEDER.—W. C. Bibb, Madison, Ga.
113,483.—LET-OFF MECHANISM FOR LOOMS.—E. B. Bigelow, Boston, Mass.
113,484.—PLOW.—Jerome Blanchard, Iowa Falls, Iowa.
113,485.—ELASTIC CEMENT FOR LINING PETROLEUM BARRELS.—J. J. K. Boote and W. A. Gibson, Cleveland, Ohio.
113,486.—MANUFACTURE OF RUBBER BELTING.—A. O. Bourn, Providence, and I. F. Williams, Bristol, R. I.
113,487.—EDGING MACHINE.—Henry Bradt, Manistee, Mich.
113,488.—MACHINE FOR REDUCING WOOD FOR THE MANUFACTURE OF PAPER PULP.—James Bridge, Augusta, Me.
113,489.—TURBINE WATER WHEEL.—McK. A. Brooks, La Porte, Ind.
113,490.—JOURNAL BOX.—A. G. Brown, Wareham, Mass.
113,491.—FILTER.—James Brown (assignor to I. D. Thompson), San Francisco, Cal.
113,492.—HEATING STOVE.—Esek Bussey, Troy, N. Y.
113,493.—WASHING MACHINE.—J. E. Carroll and John Lord, Philadelphia, Pa.
113,494.—JOURNAL BOX.—W. T. Carroll, Medway, Mass., assignor to George Draper & Sons.
113,495.—CORN HUSKER.—E. H. Carver, Humberstone, Canada, and G. M. Baker, Buffalo, N. Y.
113,496.—HASP LOCK.—W. N. Chamberlain, Denton, Mich.
113,497.—CRADLE.—J. B. Charlton, Kalamazoo, Mich.
113,498.—SEWING MACHINE.—Milton Chase, Haverhill, Mass.
113,499.—LOCK FOR HAND-CUFFS.—H. H. Cheney, East Saginaw, Mich.
113,500.—WEATHER STRIP.—F. A. Coats, Kelloggsville, Ohio.
113,501.—PLATE BUTT HINGE.—J. J. Crooke, Southfield, and Lewis Crooke, New York city.
113,502.—PREPARATION OF PAPER PULP AND MANUFACTURE OF PAPER.—Julien Denis, Stamford street, Blackfriars, Great Britain. Antedated March 24, 1871.
113,503.—COMPRESSION COCK.—William Dinnen (assignor to the Detroit Novelty Works), Detroit, Mich.
113,504.—CARRIAGE SEAT AND TOP.—L. Z. Dodds, South Bend, assignor to himself and J. B. Moulton, La Porte, Ind.
113,505.—PRESERVING AND TRANSPORTING FRESH MEAT.—William Dugan, Chicago, Ill.
113,506.—DRAWER-PULL LABEL HOLDER.—J. A. Evarts and Pietro Cinquini (assignors to Bradley & Hubbard), West Meriden, Conn.
113,507.—HYDRANT.—James Fernan, Cleveland, Ohio.
113,508.—CONSTRUCTION OF STEAM HAMMER STANDARDS.—O. C. Ferris and F. B. Miles, Philadelphia, Pa.
113,509.—FIRE ESCAPE.—William Gardner, Boston, Mass. Antedated March 30, 1871.
113,510.—RAILROAD SPIKE.—Charles Gaylord, Washington, D. C. Antedated March 29, 1871.
113,511.—CULTIVATOR.—Julius Gerber and Horace Brown, Rockford, Ill.
113,512.—MACHINE FOR TAPPING NUTS.—J. L. Gill, Jr., Columbus, Ohio.
113,513.—GASOLINE ATTACHMENT FOR COOKING STOVES.—Frederick Hainsworth, Chicago, Ill.
113,514.—BRICK MACHINE.—Enoch Hallett, Hillsdale, Mich
113,515.—FLY TRAP.—C. R. Hardy, Lexington, Ind.
113,516.—FITTER.—Birdsill Holly, Lockport, N. Y.
113,517.—REGULATING AND SAFETY VALVE.—Birdsill Holly Lockport, N. Y.
113,518.—BALE TIE.—John Holmes and J. C. H. Slack, Manchester, England.
113,519.—FINGER GUARD.—Levi Holmes, Greenpoint, N. Y.
113,520.—CULTIVATOR.—Almon Hunt, Macomb, Ill.
113,521.—KING BOLT FOR CARRIAGES.—Dwight Hyde and E. H. Andrews, Bridgeport, N. Y.
113,522.—SEED DRILLING MACHINE.—Oliver Hyde, Oakland, Cal.
113,523.—BALANCE VALVE FOR STEAM ENGINES.—Nelson Jenkins, Detroit, Mich.
113,524.—PACKING TUBE FOR VAPOR LAMPS.—W. E. Jervey New Orleans, La.
113,525.—THILL COUPLING.—D. A. Johnson, Boston, Mass.
113,526.—SOAP FOR POLISHING METALS, ETC.—E. A. Johnson (assignor to himself and Alexander Warfield), Philadelphia, Pa.
113,527.—CHIMNEY TOP.—M. S. Kavanaugh, Detroit, Mich.
113,528.—SPARK ARRESTER FOR LOCOMOTIVES.—Francis Kearney, and L. F. Tronson, Newark, N. Y.
113,529.—PLATFORM SCALE.—Michael Kennedy, New York city.
113,530.—LIGHTNING ROD.—Lewis King, East Cleveland, Ohio.
113,531.—SAWING MACHINE.—P. F. King and E. H. King, St. Louis, Mo.
113,532.—DOLL.—Jacob Lacmann, Philadelphia, Pa.
113,533.—STEAM GENERATOR.—E. D. Lacy (assignor to B. C. Sears, Rockford, Ill.
113,534.—GRINDING MILL.—F. H. La Port, Clarinda, Iowa.
113,535.—BASE-BURNING STOVE.—S. H. La Rue (assignor to himself and W. J. Hoxworth), Allentown, Pa. Antedated April 1, 1871.
113,536.—DEPURATOR.—F. C. Leland and S. W. Poland Mass.
113,537.—WINDOW SCREEN.—C. F. Linscott, Chicago, Ill.
113,538.—BUREAU TRAVELING TRUNK.—Hector McKinnon, Cleveland, Ohio.
113,539.—BERTH FOR SLEEPING CARS.—B. F. Manier (assignor to himself and T. R. Smith), Green Island, N. Y.
113,540.—BRICK AND OTHER MOLDS.—Henry Martin, Brooklyn, N. Y.
113,541.—HARNESS SADDLE-TREE.—J. H. Martin, Columbus Ohio.
113,542.—NEEDLE SETTER AND THREADER.—C. F. Martine, Boston, Mass.
113,543.—WEIGHING ATTACHMENT TO WAGONS.—W. H McCormick (assignor to himself and J. T. Williams), Muncie, Ind.
113,544.—SPINDLE FOR WRINGER ROLLERS.—T. E. McDonald, Trenton, N. J.
113,546.—MACHINE FOR TRIMMING THE SOLES OF BOOTS AND SHOES.—Daniel McLaughlin, Baltimore, Md.
113,547.—PACKING PISTON OF STEAM ENGINES, ETC.—J. C. Merriam, Olneyville, R. I.
113,548.—FOLDING TABLE TOP.—C. W. Mills, Chicago, Ill.
113,549.—FIRE POT FOR STOVES AND FURNACES.—Edward Mingay, Boston, Mass.
113,550.—CORN PLANTER.—William Morrison, Carlisle, Pa.
113,551.—CARRIAGE STEP.—Francis B. Morse (assignor to H. D. Smith & Co.), Plantsville, Conn.
113,552.—HORSE HAY RAKE.—William A. Myers, York, Pa.
113,553.—STEAM ENGINE.—Nathan E. Nase, Westerly, R. I.
113,554.—WEATHER-BOARD GAGE.—Matthew Newlove (assignor to himself and George Giebrick), Burlington, Iowa.
113,555.—HOISTING APPARATUS.—C. R. Otis and N. P. Otis, Yonkers, N. Y.
113,556.—COOKING STOVE.—Daniel E. Paris, Troy, N. Y.
113,557.—METAL SCREW AND NUT.—Henry G. Pearson, New York city.
113,558.—PEN HOLDER.—Oliver A. Pennoyer, Washington, D. C.
113,559.—FRAME FOR WIRE MATTRESSES.—Geo. C. Perkins, Hartford, Conn.
113,560.—DOVETAILING MACHINE.—David Pomeroy (assignor to Elander Heath) San Francisco, Cal.
113,561.—PADDLE WHEEL.—Elijah Pratt, New York, assignor to himself, David Mundell and Alfred Mundell, Brooklyn, N. Y.
113,562.—ARTICLE FOR FOOD FROM ALGÆ OR SEA MOSSES.—William J. Rand, Jr., Brooklyn, E. D., N. Y.
113,563.—CLOTHES-LINE CONDUCTOR.—David Reed and Amos Shaeffer, Medway, Ohio.
113,564.—GRAIN DRILL.—Daniel Rentchler, Belleville, Ill.
113,365.—MACHINE FOR SAWING STAVES.—Assaria Rewrick San Francisco, Cal.
113,566.—FRICTION CLUTCH.—George S. Reynolds, Lebanon, N. H.
113,567.—GAS HEATER.—Orlando McKnight Reynolds and David Tuttle Kitchell, Oil City, Pa.
113,568.—WHIFFLETREE.—Joseph H. Riggs, Chelsea, Mass.
113,569.—MEDICAL COMPOUND.—Joseph A. Robbins, Medford, Mass.
113,570.—OILCLOTH PRINTING MACHINE.—Charles Rommel, Elizabeth, N. J.
113,571.—DENTIST'S INSTRUMENT STAND.—John J. Ross, Hernando, Miss.
113,572.—FISH-NET SUPPORTER.—Benjamin Rider, Jr., South Orrington, Me.
113,573.—SPRING FOR VEHICLES.—Cyrus W. Salladee, St. Catharines, Canada.
113,574.—SPRING FOR VEHICLES.—C. W. Saladee, St. Catharines, Canada.
113,575.—RING SPINNING MACHINE.—J. H. Sawyer, Lowell Mass.
113,576.—SOFA BED.—Charles C. Schmitt, New York city.
113,577.—BUTTON.—Gustav Adolph Schultz, Louisville, Ky.
113,578.—KINDLING MATERIAL.—Theodore Schwartz, New York city.
113,579.—FEED CUTTER.—Joseph Seaman, Chicago, Ill.
113,580.—CHURN.—Abryham Shaffer, Vandalia, Mich.
113,581.—FLY BRUSH.—David Shankland and E. B. Hopkinson, Nevada City, Cal.
113,582.—WASH BOILER.—John H. Siebcke, Ann Arbor, Mich.
113,688.—REFINING IRON AND STEEL.—A. H. Siegfried, South Bend, Ind., assignor to himself and G. B. Garmon.
113,584.—PROCESS AND APPARATUS FOR THE PRODUCTION OF CAST STEEL FROM ORES.—C. W. Siemens, Westminster, England.
113,585.—HOISTING APPARATUS.—Thomas Silver, New York city.
113,586.—CURRENT WATER WHEEL.—H. B. Sinclair, Paw Paw, Mich.
113,587.—MANUFACTURE OF STEEL.—Fred. J. Slade, Trenton, N. J.
113,588.—ROOFING COMPOSITION.—J. H. Smyser, Pittsburgh, Pa.
113,589.—ELECTRO-MAGNETIC BURGLAR ALARM.—J. P. Snyder, Brooklyn, N. Y.
113,590.—APPARATUS FOR EVAPORATING CANE JUICE, ETC.—Ebenezer Sperry, Chicago, Ill.
113,591.—LIQUID AND GAS METER.—D. B. Spooner, Syracuse, N. Y.
113,592.—WATER WHEEL.—John H. Staples (assignor of one half his right to John H. Ferguson & Samuel Clark, and one half to Samuel Clark), Wells.
113,593.—SEWING BOOTS AND SHOES.—Michael J. Stein, New York city.
113,594.—SPINNING WHEEL.—Joseph Strain, Artemesia, Canada.
113,595.—KING BOLT FOR WAGONS.—L. T. Swartwout, Locke, N. Y.
113,596.—BED BOTTOM.—Joseph Tinney, Westfield, N. Y.
113,597.—WATER METER.—Wm. Van Anden, Poughkeepsie, N. Y.
113,598.—AXLE GAGE.—Richard K. Vestal, Santa Cruz, Cal.
113,599.—OIL RESERVOIR FOR AXLE BOXES.—E. Von Jeinson and J. M. McDonald, San Francisco, Cal.
113,600.—BALANCE VALVE.—Alexander Wanich, Philadelphia, Pa.

113,601.—Combined Thimble and Locket.—William A. Wansleben, Washington, D. C.

113,602.—Smoke House.—Asa Waterman, Providence, R. I.

113,603.—Bottle Fastening.—E. D. Weatherbee, Worcester, Mass.

113,604.—Machine for the Manufacture of Composition Roofing.—Jay J. Wiggin, New York city.

113,605.—Fender or Cushion for Furniture.—George R. Willmot, Meriden, Conn.

113,606.—Pivot for Seats.—John J. Wilson, New York city.

113,607.—Bracket Seat.—John J. Wilson, New York city.

113,608.—Buffer Head and Draw Bar for Railway Cars.—John T. Wilson (assignor to himself, William D. Berry, and John A. Courtney), Pittsburgh, Pa.

113,609.—Wine Press.—Abraham F. Wyker, South Easton, Pa.

113,610.—Attachment for Sewing Machines.—Enoch S. Yentzer, Ottowa, Ill.

113,611.—Machine for Scraping Iron.—Christopher Zug, Pittsburgh, Pa.

113,612.—Electroplating with Nickel.—Isaac Adams, Jr., Boston, Mass.

113,513.—Steam Generator.—John F. Allen, New York city.

113,614.—Pipe Elbow.—William Austin and Wm. Obdyke, Philadelphia, Pa.

113,615.—Skate.—William Henry Barker, Windsor, Nova Scotia.

113,616.—Balanced Slide Valve.—A. G. Barrett, Barrett, Kansas.

113,617.—Root or Tonic Beer.—Benjamin Bates, Baltimore, Md.

113,618.—Machine for Cutting Leather.—H. H. Bigelow, Worcester, Mass.

113,619.—Perfuming and Disinfecting Apparatus.—Otto Boldemann, New York city.

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113,621.—Key-hole Guard.—George C. Bovey, Cincinnati, Ohio.

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113,623.—Shawl Strap.—Gustavus Benson Broad, Waterville, Me.

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113,630.—Faucet.—John S. Clute, Henry W. Trissler, and Walter D. Trissler, Cleveland, Ohio.

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113,633.—Connection for Railway Car.—Joseph R. Crabill, LaCrosse, Ill.

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113,635.—Machine for Cutting Lozenges, etc.—William Edward Demant, West Hoboken, N. J., assignor to himself and William Hessin, Toronto, Canada.

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113,637.—Stall for Horses.—Daniel M. Denison, Savannah, Ga.

113,638.—Attachment to Oil Well Tubings.—William W. Dewy, Tidioute, Pa.

113,639.—Buck Saw Frame.—Jerome C. Dietrich, Rochester, N. Y.

113,640.—Cotton Chopper.—Charles Bryant Douglas, Montgomery, Ala.

113,641.—Ship Pump.—David A. Dunham, Pilatka, Fla.

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113,644.—Nail and Tack Plate Feeder.—David J. Farmer, Wheeling, W. Va.

113,645.—Non-freezing Water Pipe.—Valentine Fogerty, Boston, Mass.

113,646.—Pneumatic Signaling Apparatus.—William Foster, Jr., New York city.

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113,650.—Combined Lamp and Reflector.—Henry J. Goff, Dubuque, Iowa.

113,651.—Turning and Boring Mill.—George A. Gray, Jr., Cincinnati, Ohio.

113,652.—Life Preserving Mattress.—Jas. Durell Greene, New York city.

113,653.—Machine for Facing T-Heads.—John Griffith and George W. Wundram, New York city.

113,654.—Toy.—John Hamilton Harbison, Philadelphia, Pa.

113,655.—Dumping Car.—William Henry Harding and Geo. Frederic Morse, Portland, Me.

113,656.—Vise.—William P. Harwood (assignor to James F. Hall and John L. Marshall), Cambridge, N. Y.

113,657.—Farm Gate.—Henry P. Haskin, Roscoe, Ill.

113,658.—Boot and Shoe Heel Burnishing Machine.—Gardner C. Hawkins and Albert G. Mead, Boston, and Vivian Kimball Spear, Lynn, Mass.

113,659.—Shirt.—James Hayden, Philadelphia, Pa.

113,660.—Showcase.—George A. Hearn, Jr., New York city.

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113,662.—Chair and Bed Combined.—Gabriel D. Heathwole, Bridgewater, Va.

113,663.—Staple Machine.—Benjamin Hershey, Erie, Pa., assignor to himself, E. Geer, Richard Dudley and Richard F. Gaggin.

113,664.—Rubber Spring for Wagons.—Aaron Higley, Cleveland, Ohio.

113,665.—Attaching Plow Points.—George W. Hildreth, Lockport, N. Y.

113,666.—Machine for Sapping Timber for Shingles.—George M. Hinkley, Milwaukee, Wis.

113,667.—Fire Escape.—Joseph Hoeflinger, Carrollton, Mo.

113,668.—Surface Condenser.—Birdsill Holly, Lockport, N. Y.

113,669.—Ruffle Guide and Band Holder for Sewing Machines.—Elijah Leavitt Howard, Malden, assignor to George Augustus Whiting, Charlestown, Mass.

113,670.—Machine for Sharpening Horseshoe Calks.—Hamilton Howell, Salem, Ohio.

113,671.—Cotton Planter.—John Hughes, New Berne, N. C.

113,672.—Machine for Dressing and Punching Slates.—Julius Jaeger, Tompkinsville, N. Y.

113,673.—Sash Holder.—Morton Judd, New Haven, Conn.

113,674.—Coffee Pot.—Richard H. Kuper, Lockport, N. Y.

113,675.—Machine for Covering Cord.—Reuben Lewis, New York city.

113,676.—Millstone Exhaust.—Jacob Lingenfelter, Bloody Run, Pa.

113,677.—Shot Cartridge.—Charles W. Lovett, Jr., Boston, Mass.

113,678.—Slate Frame.—Peter Lugenbell and William A. Ford, Greensburg, Ind.

113,679.—Lubricating Wool during the Process of Manufacture.—John James Lundy, Leith, near Edinburgh, Great Britain. Antedated April 4, 1871.

113,680.—Bit Brace.—John T. Lynam, Jeffersonville, Ind.

113,681.—Axle Skein.—Lorenzo Mayhew, Greenfield, N. Y.

113,682.—Wheel for Vehicles.—Robert W. McClelland (assignor to himself and John McCreery), Springfield, Ill.

113,683.—Extensible Shelf.—Sophia H. Merser, Washington, D. C.

113,684.—Heel Trimming Machine.—John Q. Moulton, Lynn, Mass.

113,685.—Lubricating Pivot for Turn Table.—John W. Murphy, Philadelphia, Pa.

113,686.—Machine for Cleaning Grain.—Moses T. Nesbitt, Colora, Md.

113,687.—Mechanical Movement.—Archibald Nimmo (assignor to himself, Thomas Moran, and Valentine Stausse), Philadelphia, Pa.

113,688.—Pulley Block.—Joseph W. Norcross, Boston, Mass.

113,689.—Tackle Hook.—Joseph W. Norcross, Boston, Mass.

113,690.—Milk Cooler.—Albert Northrop, Elyria, Ohio.

113,691.—Excavator.—Jason C. Osgood, Troy, N. Y.

113,692.—Combined Bedstead, Bureau and Stand.—Anna Parker and Lewis A. Parker, Girard, Kan.

113,693.—Self Recording Barometer.—David Peelor, Johnstown, Pa.

113,694.—Stovepipe Drum.—William L. Phillips, Normal, Ill.

113,695.—Glove.—John H. Putman, Gloversville, N. Y.

113,696.—Whiffletree.—S. L. Reynolds and J. W. Reynolds, Pittsburgh, Pa.

113,697.—Sliding Door Hanger.—Geo. Rumsey, Watkins, N. Y.

113,698.—Sawing Machine.—S. S. Sherman and H. B. Gunn, Eau Claire, Wis.

113,699.—Die for Taking Impressions from Cloth, etc.—John Joseph C. Smith, Somerville, assignor to Metallic Art Works, Boston, Mass.

113,700.—Cotton and Hay Press.—Reuben Stallings, Louisburg, N. C.

113,701.—Variable Eccentric for Steam Engine Governor.—Samuel Stanton, New York city.

113,702.—Manufacture of Pneumatic Gas for Illuminating, etc.—John W. Stow, San Francisco, Cal.

113,703.—Sawing Machine.—Jerome B. Sweetland, Pontiac, Mich.

113,704.—Sewing Machine for Umbrellas and Parasols.—W. J. Tate (assignor to W. A. Drown & Co.), Philadelphia, Pa.

113,705.—Carriage.—Chauncey Thomas, Boston, Mass.

113,706.—Preserving Wood.—N. H. Thomas, New Orleans, La.

113,707.—Leather-rounding Machine.—James H. Tizzard, Easton, assignor to himself and S. B. Tizzard, Dayton, Ohio.

113,708.—Roll for Rolling Hoop, Bar, and Rod Iron.—James Tranter and Joseph Kinsey, Cincinnati, Ohio.

113,709.—Shovel Handle.—H. C. Trask, Vienna, Me.

113,710.—Wagon Spindle.—J. M. Walters, Schwenksville, Pa.

113,711.—Stove Utensil Holder.—Stewart Watt, Barnesville, Ohio.

113,712.—Wash Boiler.—W. A. Wells, St. Paul, Minn., and L. P. Converse, Milwaukee, Wis.

113,713.—Medical Compound or Bitters.—S. R. Whitlow, Limestone township, Ill.

113,714.—Reed Organ.—G. W. Woodruff (assignor to John Farris), Hartford, Conn.

113,715.—Trunk.—John Young, Buffalo, N. Y.

113,716.—Surface Blow-off Pipe for Boilers.—James Perkins (assignor to himself and Jacob Brandt, Jr.), Baltimore, Md.

113,717.—Corn Planter.—G. W. Lewis, Winchester, Ky.

113,718.—Combined Planter and Seeder.—Samuel Hiestand, Hillsborough, Ohio.

REISSUES.

4,328.—Printing Photographs.—Joseph Albert, Munich, Bavaria.—Patent No. 97,336, dated Nov. 30, 1869.

4,329.—Division A.—Water Wheel.—Joel T. Case, Bristol, Conn., assignor to The National Water Wheel Co.—Patent No. 108,757, dated Nov. 1, 1870.

4,330.—Division B.—Water Wheel.—Joel T. Case, Bristol, Conn., assignor to The National Water Wheel Co.—Patent No. 108,757, dated Nov. 1, 1870.

4,331.—Division A.—Lantern.—W. H. Bonnell (assignor to himself and Horace Parmalee), Buffalo, N. Y.—Patent No. 96,772, dated Nov. 16, 1869.

4,332.—Division B.—Lantern.—W. H. Bonnell (assignor to himself and Horace Parmalee), Buffalo, N. Y.—Patent No. 96,772, dated Nov. 16, 1869.

4,333.—Tool Holder.—W. W. Draper, Greenfield, Mass.—Patent No. 22,685, dated January 18, 1859.

4,334.—Stem-setting Watch.—Jules Jurgensen, Locle, Switzerland.—Patent No. 61,207, dated January 15, 1867.

4,335.—Car Spring.—Albert Hebbard and John P. Onderdonk, Buffalo, N. Y., assignees of Albert Hebbard.—Patent No. 53,222, dated March 13, 1866.

4,336.—Stock Car.—Lee Swearingen, Grafton, W. Va., assignor to the National Cattle Car Co., Salem, Ohio. Patent No. 28,517, dated May 29, 1860.

4,337.—Air-compressing Apparatus.—John S. Patric, Rochester, N. Y.—Patent No. 47,328, dated April 18, 1865.

4,338.—Faucet.—James Powell, Cincinnati, Ohio.—Patent No. 25,349, dated Sept. 6, 1859.

4,339.—Car Coupling.—W. B. Snedaker, Phœnix, N. Y.—Patent No. 108,404, dated October 18, 1870.

4,340.—Cattle Car.—John W. Street, Marshalltown, Iowa.—Patent No. 96,362, dated Nov. 2, 1869.

4,341.—Wheelbarrow Frame.—Beckwith W. Tuthill, Oregon City.—Patent No. 110,698, dated January 3, 1871.

DESIGNS.

4,773.—Bottle.—T. A. Atterbury, Birmingham, Pa.

4,774.—Ornamentation of Glassware.—Mary B. Campbell (assignor to Campbell, Jones & Co.), Pittsburgh, Pa.

4,775 to 4,778.—Carpet Pattern.—R. R. Campbell (assignor to Lowell Manufacturing Co.), Lowell, Mass. Four patents.

4,779.—Burial Casket.—E. L. Cooke and J. H. Whitmore, Hartford, Conn.

4,780.—Handle for Stop Cocks.—W. S. Cooper (assignor to Cooper, Jones & Co.), Philadelphia, Pa.

4,781 to 4,787.—Carpet Pattern.—Albert Cowell (assignor to James Humphries & Sons), Kidderminster, England. Seven patents.

4,788.—Fork or Spoon Handle.—John M. Culver (assignor to Hall, Elton & Co.), Wallingford, Conn.

4,789.—Bitter Tube.—John L. Dawes, Pittsburgh, Pa.

4,790.—Hinge.—Thomas Drake, Cincinnati, Ohio.

4,791.—Flange and Crank.—W. W. Eastman, Meadville, Pa.

4,792.—Printed Fabric.—Thomas Hardcastle, of the Bradshaw Works, near Bolton, England.

4,793.—Puzzle Block.—Samuel Loyd, New York city.

4,794.—Steam Engine Governor Case.—J. A. Lynch, Boston, Mass.

4,795.—Watch Plate.—Eugene Marcile, New York city.

4,796.—Box.—A. H. Mershon, East Saginaw, Mich.

4,797.—Clock Case.—Nicholas Muller, New York city.

4,798.—Carpet Pattern.—E. J. Ney, Dracut, Mass., assignor to Robert Beattie & Sons, Little Falls, N. J.

4,799.—Watch Plate.—E. H. Perry, Boston, Mass.

4,800.—Revolving Grate.—John D. Vance (assignor to himself and F. M. Eddy), Cincinnati, Ohio.

4,801.—Printed Material for Aprons.—Wm. H. Walton, Brooklyn, N. Y.

4,802.—Printed Material for Gored Skirts.—Wm. H. Walton, Brooklyn, N. Y.

4,803.—Hand Stamp.—Frank Waters (assignor to Thos. W. Starr), Philadelphia, Pa.

4,804 to 4,808.—Ornament for Fountains, etc.—Jonathan Moore and William Wilkinson (assignors to Jonathan Moore and A. Horton), Brooklyn, N. Y. Five patents.

4,809.—Fountain Vase.—Jonathan Moore and Wm. Wilkinson (assignors to Jonathan Moore and A. Horton), Brooklyn, N. Y.

TRADE MARKS.

216.—Thrashing Machine.—James Brayley, Buffalo, N. Y.

217.—Plow.—Bucher, Gibbs & Co., Canton, Ohio.

218.—Bitters.—Dr. S. B. Hartmann & Co., Lancaster, Pa.

219.—Stationers' Hardware.—T. S. Hudson, East Cambridge, Mass.

220.—Cotton Goods.—B. B. & R. Knight, Providence, R. I.

221.—Whisky.—B. K. Reynolds, Boyd's Station, Ky.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

APPLICATIONS FOR LETTERS PATENT.

762.—Burnishing the Heels of Boots and Shoes.—V. K. Spear, Lynn, Mass. March 21, 1871.

783.—Grinding, Pulverizing, and Levigating Solid Substances, and Mixing and Agitating Liquids, or Liquids and Solids together.—W. J. Menzies, New York city. March 22, 1871.

789.—Tap or Faucet for Bottles.—W. C. Ireland, Boston, Mass. March 23, 1871.

794.—Fiber for Paper Pulp, Textile Fabrics, Yarns, etc.—Henry Von Paul, Hannibal, Mo. March 23, 1871.

796.—Lubricator.—N. Siebert, San Francisco, Cal. March 23, 1871.

814.—Sewing Machine Attachment for Buttonholing and Overseaming.—J. K. Pruyn, New York city, residing at 53 Chancery Lane, London, Eng. March 25, 1871.

821.—Garter.—Frank Armstrong, Bridgeport, Conn. March 27, 1871.

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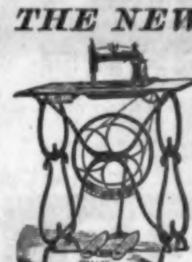

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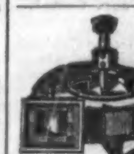

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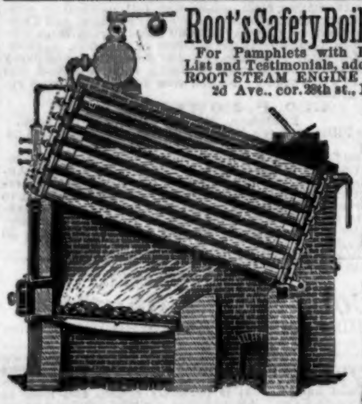

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